FINAL REPORT

Demonstration and Validation of a Waste-to-Energy Conversion System for Fixed DoD Installations

ESTCP Project EW-200932

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14. ABSTRACT
Infoscitex Corporation, in collaboration with MSW Power Corporation, evaluated the potential of a distributed waste-to-energy conversion (WEC) system to provide fixed DoD sites with a local, controllable supplemental energy source. The GEM WEC system, developed by IST and productized by MSW Power, was demonstrated at Edwards Air Force Base (AFB) in California USA. The GEM system is an integrated, stand-alone, 3 ton-per-day throughput system consisting of three major modular components: 1)Waste Handling. A versatile solid waste preprocessing unit capable of converting a range of waste streams (refuse derived fuel and biomass, such as wood), into waste-based fuel pellets of ideal size, density, and moisture content for gasification. 2) Gasifier. A clean-burning gasification unit capable of generating a low tar, low particulate producer gas of composition suited to produce on-site electricity from an electrical generator. 3)Electrical Generator. An electric generator for the ESTCP demonstration unit designed for operating with diesel fuel was modified to accept producer gas from the GEM gasifier.

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List of Acronyms

ABW	Air Base Wing
AFB	Air Force Base
AFTCC	Air Force Flight Test Center
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BTU	British thermal unit
CARB	California Air Resource Board
CCR	California Code of Regulation
CDW	Construction and Demolition Waste
CE	Civil Engineering Division
CHP	Combined Heat and Power
DoD	Department of Defense
EGR	Exhaust Gas Recirculation
EKAPCD	Eastern Kern Air Pollution Control District
EPA	Environmental Protection Agency
ESTCP	Environmental Strategic Technology Certification Program
FY	Fiscal Year
GC-FPD	Gas Chromatography with Flame Photometric Detector
GCV	Gross Caloric Value
GEM	Green Energy Machine
GHG	Greenhouse Gas
HC	Hydrocarbon
HMI	Human-Machine Interface
ISO	International Organization for Standardization
IST	Infoscitex Corporation
kWe	Kilowatt (electrical)
kW_T	Kilowatt (thermal)
MBAL	Main Base Active Landfill
MMBTU/hr	Million British Thermal Units per hour
MRE	Meal Ready to Eat
MSW	Municipal Solid Waste
MWe	Megawatt (electrical)
MW_T	Megawatt (thermal)
NMHC	Non-Methane Hydrocarbon
NOX	Nitrogen Oxides
NSCR	Non-Selective Catalytic Reduction
PBP	Payback Period
PI	Principal Investigator
PID	Process and Instrumentation Diagram
PLC	Programmable Logic Controller
PM	Particulate Matter
RDF	Refuse-Derived Fuel
ROC	Recycling Operations Center
ROI	Return on Investment

SBIR	Small Business Innovation Research
SCADA	Supervisory Control and Data Acquisition
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
STLC	Soluble Threshold Limit Concentration
SWP	Solid Waste Preprocessor
TARDEC	Tank and Automotive Research Development and Engineering Center
TCLP	Toxicity Characteristic Leaching Procedure
TTLC	Total Threshold Limit Concentration
UGR	Unitized Group Ration
USG	United States Government
VFD	Variable Frequency Drive
VOC	Volatile Organic Compound
WEC	Waste to Energy Conversion

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Executive Summary

The Department of Defense (DoD), through the Environmental Security Technology Certification Program (ESTCP), demonstrates innovative energy technologies that address the following objectives:

- **Reduce energy costs.** The United States Government (USG), and the DoD in particular, represents a significant portion of American energy usage. Specifically, the US Government accounted for 1,117 trillion BTU of the 97,301 trillion BTU consumed by the United Stated in 2011 [1]. The DoD was responsible for consumption of 890 trillion BTU, or approximately 80%, of the Federal Government's use [1].
- **Mitigate environmental impacts.** The majority of facility energy consumed by the DoD comes from fossil energy sources (695 trillion BTU in 2011) [1], which contributes to greenhouse gas (GHG) production.
- **Improve assurance and energy security.** DoD facilities rely on commercial electric grids for power, and this reliance creates a risk for continuity of critical mission operations.

In 2011, renewable energy accounted for just 9% of total energy consumption in the US, and just 5% (or 0.45% overall) of that (477 trillion BTU) was derived from waste [1]. Waste is abundant through the populated world, and DoD installations, both fixed and forward, are no exception. The ubiquity of waste and its chemical energy content make it a good candidate alternative fuel choice, and specifically as a potential means to address the three above-referenced DoD objectives. In FY2010, the Department of Defense generated approximately 6,600 tons per day of municipal solid waste (MSW), excluding construction and demolition (C&D) waste [2]. This waste provides a potential to capture approximately 165 MW_e of electricity and 500 MW_T of waste heat, resulting in a net solid waste reduction to landfills of 6,300 tons per day.

DEMONSTRATION HARDWARE

Infoscitex Corporation, in collaboration with MSW Power Corporation, evaluated the potential of a distributed waste-to-energy conversion (WEC) system to provide fixed DoD sites with a local, controllable supplemental energy source. The Green Energy Machine (GEM) WEC system, developed by IST and productized by MSW Power, was demonstrated at Edwards Air Force Base (AFB) in California. The GEM system is an integrated, stand-alone, 3 ton-per-day throughput system consisting of three major modular components:

- **Waste Handling.** A versatile solid waste preprocessing unit capable of converting a range of waste streams (refuse derived fuel and biomass, such as wood), into waste-based fuel pellets of ideal size, density, and moisture content for gasification.
- **Gasifier.** A clean-burning gasification unit capable of generating a low tar, low particulate producer gas of composition suited to produce on-site electricity from an electrical generator.
- **Electrical Generator.** An electric generator for the ESTCP demonstration unit designed for operating with diesel fuel was modified to accept producer gas from the GEM gasifier. The commercial genset has an original rated capacity of 115 kW_e on diesel fuel. However, due

the composition of the syngas and the lower efficiency of a duel fuel system, the genset is capable of providing a maximum gross output of 64 kW_e. Since the GEM requires 28 kW_e to operate, the net output of the system is 36 kW_e.

An integrated control system allows 24x7, weather-independent operation with minimal manpower supervision. When integrated, the GEM system provides a turnkey, alternative energy source that requires no segregation of food waste and has the ability to supplement the energy needs of fixed military and commercial installations. The WEC system can be designed to physically separate the preprocessing system from the gasifier and electrical generator. As an example, the preprocessing system can be placed at the landfill site, while the gasifier and generator can be situated near the electrical grid interconnection point. For the ESTCP Demonstration, all of the components of the GEM system were co-located and integrated.

Approximately 18 tons per day of solid waste, exclusive of construction and demolition waste, is generated by both DoD and civilian employees at Edwards AFB. As with all DoD installations, Edwards AFB has an extensive paper, plastic, and metal recycling operation to minimize the burden on its landfill while maximizing the recovery and reuse of these materials. The demonstration was held at the landfill facility between the baler building (Building 7996) and the recycling operations center building (Building 7998). Situation of the demonstration activity at this site made good logistical and workflow sense at the time of selection, but did require some preparation prior to installation of the equipment. Specifically, a concrete pad was installed to support the system, a chain-link fence was installed to provide security and safety, and an electric panel at the site was repaired and upgraded.

As shown in Figure 1, the GEM was installed by the base landfill and recycling center. While selecting this site seemed intuitive from a logistics and workflow perspective, the physical siting at this location presented some unforeseen hurdles due to permitting. Indeed, operating within California offered some unique challenges, and the project experienced significant delays. The primary contributors to project delays were a state permitting process lacking transparency (including serial introduction of stakeholders and permitting) and a local utility provider that was slow to respond.

Figure 1 GEM Waste-to-Energy Conversion System Installed at Edwards AFB

OPERATING HISTORY

Despite the permitting hurdles, the demonstration was completed, with a start date approximately one year after planned completion. The system was operated for a total of 468 hours with a primary objective of demonstrating the ability of the GEM WEC system to convert MSW generated at a fixed DoD installation into useful energy. Waste composition played a large role in system performance during the demonstration period. A summary of demonstration operating history is provided in Table 1.

Table 1 Operating history of GEM demonstration at Edwards Air Force Base

Performance Metric	Target Value	Achieved Value
Total GEM Operation (hours)	592	468
Total Waste Processed (tons)	74	16.9
Avg. Waste Processed (lbs/hr)	250	72
Max Waste Processed (lbs/hr)	250	293.95
Max Average Ash Output (% of average waste processed)	10%	9.97%
Total $kWh_{(e)}$ Produced	25,974	13,689
Peak $kW_{(e)}$ Produced	64	62
Net Peak $kW_{(e)}$ Produced	36	40
Total kW_{th} Recovered	0	0
Specific Power Yield (kWh/ton)	376	810
Energy Content of Waste (BTU/lb [kWh/lb])		
Average	n/a	7,331 [2.15]
High	n/a	8,399 [2.46]
Low	n/a	5,804 [1.70]
Gross Electrical Conversion Efficiency [Net after Parasitics]		18.8% [12.2%]

RESULTS OF THE DEMONSTRATION

The demonstration plan was devised with a number of specific quantitative and qualitative performance objectives in mind:

Objective 1: Reduce amount of solid waste requiring disposal.

This objective pertained to the efficiency of the gasification process in converting combustible solid waste into producer gas. The success criteria for this objective was defined as achieving less than 10% by weight of solid waste processed by system disposed of in landfill. An average of ~10 % was achieved. This objective was successfully achieved.

Objective 2: Generate net electricity for on-site use.

This objective pertained to the viability of the resultant producer gas as a fuel for electricity generation. The success criteria was defined as achieving greater than 7% conversion of the energy contained in the solid waste into electricity. Further, a minimum output of 36 kWe was defined. A net output of 40 kWe (12.2% net conversion efficiency), with a peak conversion of 23% net for one test period, was achieved. This objective was successfully achieved.

Objective 3: Power quality.

A power quality objective was established to produce electricity from the GEM system with quality equal to, or better than, the typical power quality provided by the local utility provider. A full set of data was therefore not achievable; however, data collected was favorable. The project yielded mixed results for this objective.

Objective 4: Generate net waste heat for on-site use.
This objective pertained to the efficiency of waste heat capture for reuse by the local facility. The success criteria was defined as achieving greater than 22%, and not less than 120 kWt for waste stream comprised of 30% moisture, output of recoverable waste heat per energy contained in solid waste. Due to the host site determining waste heat capture was not of interest, and in the interest of moving the demonstration forward, this objective was not pursued. <u>This objective was not demonstrated.</u>

Objective 5: Reduce carbon footprint.
This objective pertained to the environmental benefits of the technology. The success criteria was defined as achieving greater than 45% reduction in total installation carbon footprint as compared with landfill of solid waste. A 101% reduction in total carbon footprint was calculated. <u>This objective was successfully achieved.</u>

Objective 6: Conform to ambient air quality for State of California.
This objective pertained to the ability of the system to operate within the air emission guidelines of the host state, California. The success criteria was defined as emission profile not exceeding CARB off-road large spark ignition emission standards for NMHC+NOx and CO. Air emissions testing revealed acceptable levels of particulate matter (PM) and CO. However, the system failed for NMHC+NOx, which was determined to be a result of load balancing issues associated with the load bank used in lieu of the utility interconnection agreement. <u>This objective was partially achieved.</u>

Objective 7: Estimate simple payback period.
This objective pertained to the economic viability of the system for the host site, Edwards Air Force Base. The success criteria was defined as a payback period for 3 tons per day system of less than five years. Calculated simple payback period for a system operating at full capacity is 13 years for a 24-hour operation at Edwards AFB. A system operating with a throughput consistent with the demonstration would have a 69-year payback period. <u>This objective was not achieved.</u>

Objective 8: System robustness.
This objective pertained to system reliability. Success criteria was defined as no less than 7 out of 8 hours per day for an 8 hour shift, and 22 hours, per day for 24/7 operation. Further, no more than 8 hours per month downtime associated with maintenance. Operating targets were met for some test segments and were not for others. <u>This objective was partially achieved.</u>

Objective 9: Ease of use.
This objective pertained to workforce requirements associated with the operation of the system. The criteria for success was defined as one field technician able to routinely operate and control the system with minimal supervision. Operation of the system required a single operator. It should be noted, however, that the logistics of the site waste disposal program necessitated the involvement of a second person to address hazards. No material breakdown (i.e. manual size reduction) was required before waste entered the system. <u>This objective was achieved.</u>

Objective 10: Automatic control system.
This objective pertained to workforce requirements associated with the operation of the system. The success criteria was defined as a control system able to remotely monitor, operate, and provide on-line data collection. Remote operation and data collection were demonstrated. This objective was achieved.

Objective 11: Identify single point system failures.
This objective pertained to system reliability and maintenance concerns. The success criteria was to determine risk based on estimated downtimes and capital equipment replacement costs. Some single point failures were observed during the demonstration, but were determined to be specific to the high inorganic content of the waste stream. Mitigation strategies were identified and some have already been implemented in subsequent production of the GEM. This objective was achieved.

LESSONS LEARNED FROM THE DEMONSTRATION
Implementation of the demonstration effort was a more significant challenge than had been anticipated at the outset of the project. The following regulatory approvals were required to operate the demonstration at Edwards Air Force Base:

1. License to Operate at Edwards Air Force Base
2. Experimental Exemption from Eastern Kern Air Pollution Control District (EKAPCD)
3. Generating Facility Interconnection Agreement with Southern California Edison
4. Permit Exemption from the Environmental Health Division of CalRecycle

Acquiring a license to operate at Edwards Air Force Base was a relatively straightforward activity. This required Infoscitex to submit a request to Edwards with background on the project and basis for request. Infoscitex received the license (AFMC-ED-3-10-006) once a town hall meeting was held at the base and no objections were heard. Throughout the course of the project several extensions were received as required due to the delayed imposed by permitting issues.

Initially, it was determined that the only regulatory approval that would be required was an experimental exemption from the cognizant local authority (Eastern Kern Air Pollution Control District (EKAPCD)). This was received upon completion of an application and discussion with representatives from EKAPCD (designation number 110114). While this took more time than anticipated, its receipt in March 2011 imposed only a minor delay on the project at the time.

In order to connect the GEM system to the local grid, an interconnection agreement issued by the local utility provider was required. Substantial and unexpected delays occurred due to the obstructive and unresponsive nature of the utility provider. As a result, the interconnection application was abandoned, and a load bank was installed to receive electricity generated from the GEM system.

Concurrent with the pursuit of interconnection approval, Infoscitex continued to pursue required accommodations at the site to ensure a successful operation. During the course of conversations and approval requests for various elements of the project, publicity for the project heightened. As a result, stakeholders' intervened requesting further review of Infoscitex's permitting status. Corresponding conversations brought into question whether the project would represent a

violation of Edwards' landfill permitting due to the GEM WEC system being located at the landfill and thus representing a material change in use scenario from what was described in their permit. This revelation resulted in further delays and at one point put the project at risk of being shut down due to an initial ruling by CalRecycle that the project was not in the best interest of the public. However, Infoscitex lobbied with CalRecycle, and ultimately Edwards Air Force Base received a Project Permit Exemption from the Kern County Environmental Health Division of CalRecycle on 19 March 2012.

Key takeaways from the non-technical aspects of demonstration preparation are:

- New technologies may not be addressed in regulations and local ordinances. Projects aimed at evaluating the merits of new technologies should anticipate that a significant amount of effort will be required to educate a broad base of stakeholders.
- Publicity is not always your friend. While being funded to demonstrate a new solution in a high profile setting is exciting, resist the urge to tell the world. During the course of this demonstration project, publicity encumbered permitting processes and contributed to delays.
- Siting of the demonstration is key. This demonstration was sited at the Edwards AFB landfill. Placing the system physically in the path of the waste flow seemed logistically ideal. However, this site selection prolonged the permitting process, as it required Edwards AFB to appeal for an approval of landfill use.
- Afford ample time for permitting. As proposed, IST anticipated that permitting would be achieved concurrently with system fabrication, and that there would be sufficient time to execute the demonstration within the original period of performance. However, the permitting scenario was far more complex than originally understood.

1 INTRODUCTION

1.1 BACKGROUND

The Federal Government consumed 1.1% of the total energy in the United States in 2011 [1]. The Department of Defense (DoD) is the Nation's single largest energy consumer, using 0.8% of the total U.S. energy demand and 78% of the Federal energy demand. In 2011, DoD spent $19.3B to sustain operations and facilities [3]. Facility energy costs accounted for ~21% ($4.1B). The DoD has made great progress in reducing its energy consumption for buildings and meeting the President's FY 2015 goal of 30% reduction from FY 2003 baseline [5]. In FY 2011, military installations reduced consumption by 13.3% from a 2003 baseline, underperforming the goal of 18% reduction [3].

The energy strategy of the DoD for fixed installations consists of eliminating energy waste in existing facilities, increasing energy efficiency in new construction and renovations, and reducing its dependence on fossil fuels by incorporating renewable sources of energy. The current program involves the use of municipal solid waste (MSW) generated on the fixed installations as an alternative energy source to generate electricity and heat through high temperature gasification of MSW. The use of MSW provides a way, not only to reduce waste and environmental hazards, but to create energy that can be used in a power grid. Fixed DoD installations in the United States and abroad, particularly in Europe, are coming under increasing regulatory pressure to reduce the quantity of waste that goes to on-site and off-site landfills. DoD has set an objective of reducing (diverting) non-hazardous solid waste, without construction and demolition waste, by 40% by 2010 [5, 7], while states and local municipalities may have more rigid requirements. For example, California has an annual 50% waste diversion requirement [8].

The proposed technology involves the processing of refuse derived fuel (RDF) (combustible municipal solid waste) and biomass into fuel pellets which are combusted in a downdraft gasifier, producing a syngas (producer gas) that provides the fuel for electricity and/or heat generation while reducing the amount of waste sent to the landfill by more than 90%.

Present methods for reducing the MSW produced by Americans (which accounted for ~250 million tons in 2010) going to landfills primarily involves recovery of 34.1% of the MSW for recycling and composting, ~12% consumed by combustion with energy recovery, with the remaining ~54% disposed of in landfills [9]. Incineration (burning), with and without energy recovery, produces unacceptable air and solid waste (ash) emissions. Gasification converts carbonaceous materials to producer gas by reacting the material at high temperatures (>700^{o}C) with a limited amount of oxygen. This process is more efficient than incineration in that more of the energy contained in the producer gas is extracted from the solid waste. For example, gasification produces 750-850 kW_ehr/ton waste compared to incineration with electricity generation, which produces 500-600 kW_ehr/ton waste. Gasification produces less air and solid waste emissions. Downdraft gasification, in which the air flows concurrently with the MSW fuel, generates less tar in the producer gas allowing for its direct integration with a generator, without installing a process for tar removal. Gasification of the fuel pellets is also more efficient than gasification of unconsolidated solid waste.

The amount of electricity and heat produced by the gasification of solid waste generated at fixed DoD installations, as well as cost savings, is substantial. The number of fixed DoD installations in the United States and abroad generating 3 tons per day or more of solid waste is about 330 installations based on a solid waste generation rate of 4.5 lbs of solid waste per person per day [10]; the total amount of solid waste generated by both military and civilian base employees was estimated to be 6,600 tons per day. At these installations, the waste to energy conversion (WEC) gasification system is capable of generating about 165 MW_e of electricity and 500 MW_T of waste heat, resulting in a net solid waste reduction to landfills of 6,300 tons per day.

1.2 OBJECTIVE OF THE DEMONSTRATION

The primary objective of this program was to demonstrate and validate a Waste-to-Energy Conversion (WEC) system capable of economically converting three (3) tons per day of combustible municipal solid waste (refuse-derived fuel) on fixed DoD installations for use in a downdraft gasifier producing a syngas (producer gas) and providing fuel for electricity and heat for on–site base usage. Specific objectives of the demonstration included:

- ***Reduce amount of solid waste requiring disposal***. Success criteria: ≤10% by weight of solid waste processed by system disposed of in landfill.
- ***Generate net electricity for on-site use.*** Success criteria: >7%, and not less than 36 kWe, net electricity generated per energy contained in solid waste.
- ***Power quality***. Success criteria: match quality typical of local utility.
- ***Generate net waste heat for on-site use.*** Success criteria: >22%, and not less than 120 kWt for waste stream comprised of 30% moisture, output of recoverable waste heat per energy contained in solid waste.
- ***Reduce carbon footprint.*** Success criteria: >45% reduction in total installation carbon footprint as compared with landfill of solid waste.
- ***Conform to ambient air quality for State of California.*** Success criteria: not to exceed CARB off-road large spark ignition emission standards for HC+NOx and CO.
- ***Estimate simple payback period.*** Success criteria: Less than 5 years payback period for 3 tons per day system.
- ***System robustness.*** Success criteria: >7 out of 8 hours per day for 8/5 operation and >22 hours per day for 24/7 operation; no more than 8 hours per month maintenance time.
- ***Ease of use.*** Success criteria: One field technician LOE able to routinely operate control system with minimal supervision.
- ***Automatic control system.*** Success criteria: Control system able to remotely monitor, operate, and provide on-line data collection.
- ***Identify single point system failures.*** Success criteria: Estimate downtimes and capital equipment replacement costs.

1.3 REGULATORY DRIVERS

The primary driver for reducing energy demand on DoD installations is the President's Executive Order 13423 of January 24, 2007 to the heads of each Federal agency "to strengthen the environmental, energy and transportation management of Federal agencies" and "to improve the energy efficiency and reduce greenhouse gas emissions through reduction of energy intensity by (i) 3% annually through the end of fiscal year 2015, or (ii) 30% by the end of fiscal year 2015 relative to the baseline of the agency's energy use in fiscal year 2003" [5].

This goal of energy reduction is also made more urgent by the ever-increasing number of electronic weapon systems being developed by DoD to improve operational efficiency at fixed and tactical installations. At fixed installations, extensive computer systems, dependent on obtaining electricity from a commercial power grid, are used to support these weapon systems. The vulnerability of the power grid to physical and cyber attack and extreme weather threaten the ability to accomplish critical missions in a timely manner. Effective utilization of alternative energy sources, such as municipal solid waste in an energy conversion system, is one of several methods to provide an identifiable, available and reliable energy supply [3].

The Air Force recently issued their Energy Plan, which serves as the operational framework for all military and civilian Air Force personnel in communicating the Air Force energy goals, objectives and metrics [10]. The Energy Plan is built upon three pillars that guide energy management within the Air Force: Reduce Demand, Increase Supply, and Culture Change. The need for a new gasifier technology falls under the Increase Supply pillar, in which the "Air Force is committed to increasing the amount of energy supplies available to enhance our nation's energy security. The Air Force will develop and utilize renewable and alternative energy to reduce greenhouse gas emissions. The goals and objectives to increase supply target these three areas: aviation fuel, ground fuels and ***installation energy***".

Executive Order 13423 also requires that all facilities "increase diversion of solid waste as appropriate and maintain effective waste prevention and recycling programs" [5]. The DoD has implemented integrated solid waste management programs to achieve specific solid waste diversion goals of diverting non-hazardous waste without construction and demolition waste of 40%; the goal for construction and demolition waste is 50% by 2010 [7]. Many states are also requiring waste diversion, in many cases greater than the DoD. For example, the State of California, through their Integrated Waste Management Act of 1989 [8], requires a diversion of 50% of all solid waste by January 1, 2000. In 2006, the California statewide diversion rate was 54%. In 2008, the solid waste diversion rates for San Francisco (CA), Long Beach (CA), New York (NY), Los Angeles (CA), San Jose (CA), Fresno (CA) and Portland (OR) were greater than 60% [11]. In addition to requiring solid waste diversion, the State of California has targeted landfills as being sources of greenhouse gases [8]. Diversion of solid waste from landfills, through solid waste prevention methods, recycling programs, or the use of WEC systems to reduce the solid waste being landfilled, will reduce the landfill greenhouse gas impact on the environment.

2 TECHNOLOGY DESCRIPTION

2.1 TECHNOLOGY OVERVIEW

Infoscitex (IST) developed the Green Energy Machine (GEM) WEC system for the thermal conversion of combustible municipal solid waste (paper, cardboard, plastic, wood, and food) into electricity and heat, thereby reducing the costs associated with the generation of energy and land fill. The system utilizes downdraft gasification (not incineration) technology to convert waste into distributed and clean energy. The system readily integrates into processing streams for the military, institutions and businesses and provides a highly efficient and environmentally friendly means to derive more value from refuse.

The GEM system is an integrated, stand-alone system consisting of three major modular components: (1) solid waste pre-processor, (2) thermal downdraft gasification reactor, and (3) power generation. When integrated, the GEM system provides a turnkey, alternative energy source that requires no segregation of food waste and has the ability to supplement the energy needs of fixed military and commercial installations. A typical mass and energy diagram for the GEM is provided in Figure 2.

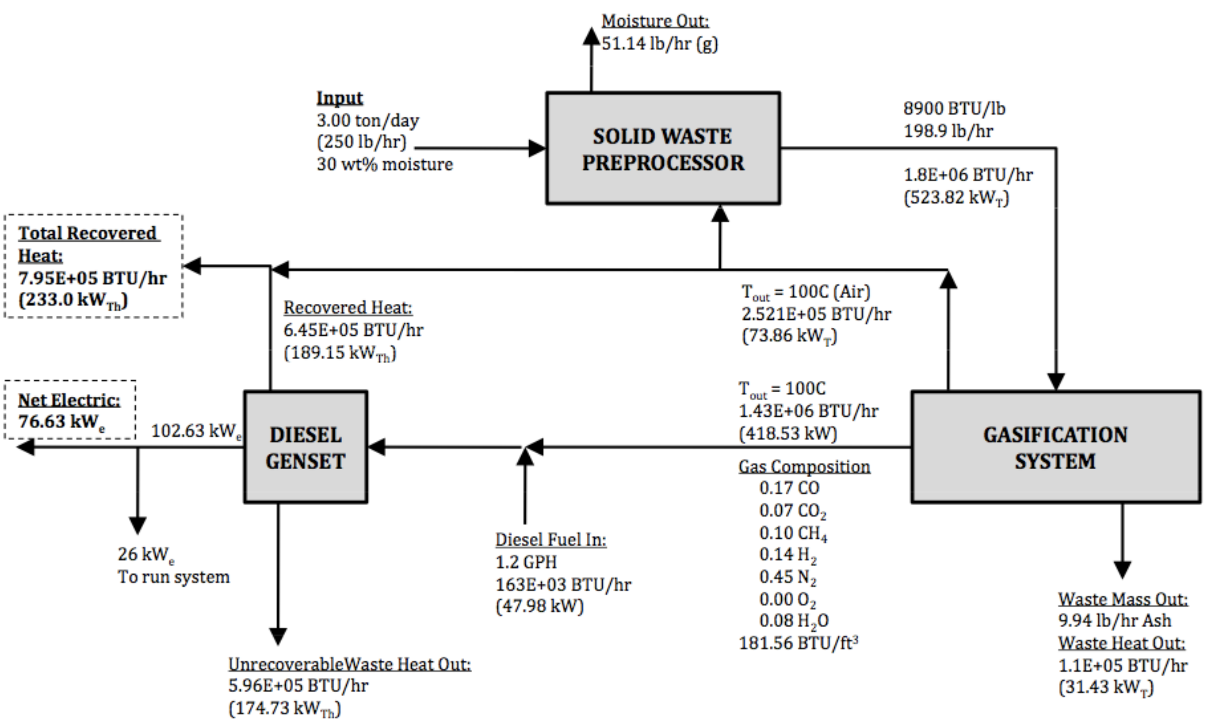


Figure 2 Typical mass and energy balance for the GEM

Details of the GEM WEC system are given below:

- A versatile solid waste preprocessing unit capable of converting a range of waste streams (refuse derived fuel and biomass, such as wood), into waste-based fuel pellets of ideal size, density, and moisture content for gasification. The solid waste is shredded, dried and

densified into pellets for use in a downdraft gasifier. Densified fuel pellets are much more desirable than unconsolidated shredded waste because they facilitate transport and feeding of the waste feedstock and permit more optimal and higher efficiency gasifier operation through control of the height of the gasification zone and air flow in the gasifier; the denser the fuel pellets, the more uniformly they will burn in the gasifier.

- The electricity required to run the preprocessing unit and the heat required to dry the shredded waste to produce high quality pellets are supplied by the gasifier/generator, or by a battery system, or from the facility, during startup. The waste generated at Edwards AFB is approximately 18 tons/day. The ESTCP demonstration unit is designed to process three (3) tons per day of solid waste.
- A clean-burning gasification unit capable of generating a low tar, low particulate producer gas of composition suited to produce on-site electricity from an electrical generator.
- An electric generator for the ESTCP demonstration unit designed for operating with diesel fuel was modified to accept producer gas from the GEM gasifier. The commercial genset has an original rated capacity of 115 kW_e on diesel fuel. However, due the composition of the syngas and the lower efficiency of a duel fuel system, the genset is capable of providing a maximum gross output of 64 kW_e. Since the GEM requires 28 kW_e to operate, the net output of the system is 36 kW_e.
- The ESTCP WEC demonstration system is capable of producing 150 kW_T of gross waste heat. Typical waste requires 30 kW_T of heat for the drying process used within the GEM process, resulting in a net of 120 kW_{T+} for use in heating of buildings or water.
- An integrated control system to allow 24/7 and weather independent operation with minimal manpower supervision.

The WEC system can be designed to separate the preprocessing system from the gasifier and electrical generator. The preprocessing system can be placed at the landfill site, while the gasifier and generator can be situated near the electrical grid. For the ESTCP Demonstration, all of the components of the GEM system were co-located and integrated.

The solid waste pre-processor was initially developed and fabricated by IST during 2005-2009 under an Army Small Business Innovative Research (SBIR) program focused on converting encampment waste generated in the forward field to on-site electrical energy and heat for use in kitchens to reduce the dependence on JP-8 fuel and the logistical burden of waste disposal [12, 13]. The capacity of the pre-processor was 3 tons per day of encampment waste (30% moisture content), which consisted of food, plastics, paper, and cardboard [14]. A small downdraft gasifier was developed and fabricated during 2005-2008 under another Army SBIR program [15, 16]. The waste feed to the gasifier was also pellets derived from encampment waste; the feed rate was approximately 10 lb/hr. The producer gas produced by the gasifier was sufficient to generate 5 kW_e.

In January 2008, IST Energy Corporation (IST Energy) was incorporated as a majority-owned subsidiary of IST to develop, market, manufacture and sell mobile, compact, and fully integrated GEM WEC systems. In August 2012, IST Energy was fully divested from IST and now operates as MSW Power Corporation. The divestiture of IST Energy was coincident with the acquisition of Infoscitex by DCS Corporation. Infoscitex operates as a wholly-owned subsidiary of DCS Corporation. MSW Power holds the proprietary rights to the process to convert solid waste

streams, such as municipal solid waste and military encampment waste into producer gas, and subsequently to electricity and heat. MSW Power has further developed the pre-processor by:

- Improving the pelletization process including controls and solids-handling systems
- Integrating the pre-processing system into the GEM WEC and providing automatic controls.
- Improving the system's tolerance for bulk metals

2.2 TECHNOLOGY DEVELOPMENT

No technology development was performed as part of the ESTCP project.

2.3 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

Downdraft gasification has a simple and stable design, generating producer gas from solid waste at a high thermal efficiency (>80%). Gasification converts carbonaceous waste materials into carbon monoxide and hydrogen (producer gas) by reaction with a controlled amount of oxygen. Producer gas provides clean combustion heat, engine shaft power and electricity from a wide variety of biomass fuels. Modular units can generate up to 1 MW_e, of electrical output or up to 2.4 MW_T of thermal load. One of the primary advantages of the GEM WEC system is its ability to efficiently treat low flow rates of solid waste. The system affects large volume reductions (>95%) of the solid wastes. Gasification takes place at temperatures above 700-800 ^oC, producing minimal pollution. A solid waste preprocessing system is required to densify the waste into pellets, producing a feedstock that is more amenable to gasification than unconsolidated waste. The GEM WEC system can be designed to separate the preprocessing system from the gasifier and electrical generator. The preprocessing system can be placed at the landfill site, while the gasifier and generator can be situated near the electrical grid. The disadvantages of the GEM WEC system are:

- The necessity to remove metals and glass prior to pelletization to reduce pelletizer maintenance time and system downtime.
- Low efficiency in converting the producer gas to electricity via an engine/generator.
- Additional costs are required to pelletize the solid waste.
- Electrical energy and waste heat are required to power the solid waste preprocessing system, reducing the total energy available for on-site use.

An alternative WEC process is pyrolysis, in which the carbonaceous waste materials are broken down under pressure and in the absence of oxygen. The process works best when the waste is carbon-rich and is a single component stream, such as wood, plastics and sewage sludge. The treatment of municipal solid waste requires extensive pre-sorting to remove the majority of non-organics and processed to homogenize the feedstock. Gasification operates at a higher temperature than pyrolysis. Pyrolysis has the potential to produce more fuels and liquids, than gases.

3 PERFORMANCE OBJECTIVES

Table 2 lists the quantitative and qualitative performance objectives of the Demonstration program. Details of each performance objective are found in the following subsections.

3.1 SOLID WASTE

This performance objective was to quantitatively determine the amount of solid waste requiring disposal in an on-site landfill from the GEM WEC demonstration system at Edwards AFB. The GEM WEC system at Edwards AFB involved the use of MSW as an energy source to generate electricity and heat for on-site use. One of the primary drivers in determining the overall efficiency and cost savings/payback period of the GEM WEC system was the reduction of solid waste that is transported to and ultimately disposed of in an on-site or off-site landfill. The metric used to assess the success of this objective was the quantity of the solid waste (total of bottom ash and fly ash) disposed of into the landfill after gasification relative to the solid waste transported to and treated by the GEM WEC system. The data required to calculate the metric were the weight of the bottom and fly ash over a given time period, the pellet feed weight into the gasifier, the moisture content of the solid waste into the shredder, and the moisture content of the pellets (Section 6.1). The criterion used to determine success of the Demonstration for this performance objective was that less than 10% of the ***combustible*** solid waste (i.e. waste stream excepting glass and metal) processed by the GEM WEC was disposed of in the landfill. This translates into less than 0.3 ton/day (<600 lbs/day) for a 3 ton/day WEC system with a 30 percent moisture content.

3.2 NET ELECTRICITY FOR ON-SITE USE

This performance objective was to quantitatively determine the net electricity generated by the GEM WEC system for on-site use. The net electricity was the electricity produced by an electrical generator operating with the producer gas generated in the gasifier less the parasitic energy required for pre-processing of unconsolidated solid waste to pellets and for gasification of the pellets in the downdraft reactor. The parasitic loss for pre-processing is many times larger than that associated with gasification. The total electricity generated by the GEM WEC system was not put back into the electrical grid at Edwards AFB due to issues with the local utility provider and their approval process for interconnection. Rather, the GEM was connected to a load bank for the purposes of demonstration. The cost savings associated with the net or excess-generated electricity is one of the cost savings factors for the GEM WEC system. The metric used to assess the success of this objective was the quantity of net electricity generated relative to the energy contained in the pellets prior to gasification. The data required to calculate the metric were the electrical output of the generator, the parasitic loss of the preprocessing and gasifier subassemblies, the gross heating value of the pellets, and the pellet flow rate into the gasifier. The criterion used to determine success of the Demonstration for this performance objective was that greater than 7% of the energy in the pellets was generated as net electricity for on-site use. This translates into >36 kW_e for a feed input pellet energy of 520 kW_T corresponding to a 3 ton per day waste stream with a 30 % moisture content dried to 12 % moisture content of the pellets.

Table 2 Performance objectives

Performance Objective	Metric	Data Requirements	Success Criteria	Result	Rating
Quantitative Performance Objectives					
Reduce amount of solid waste requiring disposal	Tons/day of solid, non-hazardous, non-construction, waste sent to landfill	Disposal data and ash content of solid waste	<10% by weight of solid waste processed by GEM WEC disposed of in landfill.	**Success.** ~10% (mass basis) of the waste processed by the GEM required landfill disposal.	**GREEN**
Generate net electricity for on-site use	Efficiency of energy production process to produce electricity	Metering data for net electricity produced and energy of solid waste processed by gasifier (kW_T)	>7% net electricity generated per energy contained in solid waste.	**Success.** ~23% net electricity generated per energy contained in the solid waste.	**GREEN**
			>36 kW_e*.	**Success**. ~40 kWe net electric output.	
Power quality	Variations in voltage, frequency, flicker, harmonics, power factor and direct current injection	Monitoring data for AC power supplied to site and AC power generated by GEM WEC	Match quality typical of local utility.	**Mixed Result**. Due to issues with the local utility provider an interconnection agreement was not executed. A full set of data was therefore not achievable. Data that collected was favorable.	**YELLOW**
Generate net waste heat for on-site use	Efficiency of energy production process to produce usable waste heat	Energy content of recoverable of waste heat and energy of solid waste processed by gasifier (kW_T)	>22% energy of recoverable waste heat per energy contained in solid waste	**N/A.** Due to host site determining waste heat capture was not of interest, and in the interest of moving the demonstration forward, this objective was not pursued.	**BLACK**
			>120 kW_T* based on a feed moisture content of 30%.		
Reduce carbon footprint	Life-cycle reduction in installation carbon footprint	Inventory of carbon emissions and sequestrations	>45% reduction in total installation carbon footprint compared with landfill of solid waste.	**Success.** 101% reduction in total carbon footprint was calculated	**YELLOW**
			> 520 metric tons GHG/yr**)	**Deficient**. 200 metric ton GHG/year (full capacity operation) reduction	

Performance Objective	Metric	Data Requirements	Success Criteria	Result	Rating
Conform to ambient air quality for State of California	Concentration of gas contaminants in generator emissions	Third party/IST gas emission monitoring data	Not to exceed CARB off-road large spark ignition (>19 kW_e), > 1 liter) emission standards for HC + NO_x and CO (see Table 3-3).	**Deficient with Caveat.** Air emission testing revealed acceptable levels of PM and CO. However, the system failed for NMHC+NOx. This was due to load balancing issues with load bank.	**YELLOW**
Estimate simple payback period	Ratio of system cost to annual energy and landfill savings	Net electricity and waste heat generated, reduction in solid waste to landfill, unit cost of energy, landfill disposal costs, and system cost	Less than 5 years payback period for 3 tons/day system.	**Deficient**. For the demo site, the GEM does not represent an attractive return on investment.	**RED**
System robustness	Time in hours for system operation and maintenance	Logs of system operation and maintenance	>7 out of 8 hours per day for 8/5 operation and >22 hours per day for 24/7 operation; no more than 8 hours per month maintenance time	**Deficient with Caveat.** Mixed results in meeting operating time per test segment.	**YELLOW**
Qualitative Performance Objectives					
Ease of use	Ability of a technician-level individual to operate GEM WEC system†	Feedback from the technician on usability of the technology and time required to use	One field technician LOE able to routinely operate GEM WEC control system with minimal supervision.	**Success with Caveat.** System operation required a single operator. Note: logistics of site waste disposal program required a person to address hazards. No material breakdown was required before entering the system.	**GREEN**
Automatic control system	Remote process control and data collection of GEM WEC system	Logs of operating and performance data	Control system able to remotely monitor, operate and provide on-line data collection of GEM WEC system	**Success.** Remote operation and data collection demonstrated.	**GREEN**

Performance Objective	Metric	Data Requirements	Success Criteria	Result	Rating
Identify single point system failures	Consequences and probability of single point system failures on system robustness	Listing of critical replacement components having most impact on system downtimes and equipment replacement costs	Estimates of downtimes and capital equipment replacement costs	**Mixed Result**. Single point failures were observed, but were determined to be feedstock specific. Mitigation strategies have been identified and implemented in subsequent production of the GEM.	**YELLOW**
* Based on 520 kW_T energy contained in solid waste pellets					
** GHG – Greenhouse gas emissions, based on 3 tons/day or 1095 tons/yr solid waste.					
† Does not include personnel for collection and conveyance of waste to GEM WEC system					

3.3 POWER QUALITY

This performance objective was to quantitatively determine if the power quality or quality of the voltage, frequency and harmonics of the electricity generated by the GEM WEC system match the power quality of the AC power for the site without significant loss of performance or life. Due to complications with the local utility provider, SoCal Edison (SCE), the approach to assessing power quality was modified from the demonstration plan. The frequency, voltage, and power output of the GEM WEC System were monitored. Data pertaining to frequency and power output were collected via on-board PLCs, while voltage was collected using a portable power meter and hand tabulation of data.

3.4 WASTE HEAT

This performance objective was to quantitatively determine the net waste heat generated by the GEM WEC system. The GEM WEC is a combined heat and power (CHP) system that simultaneously generates both electricity and useful heat. This waste heat can be used for on-site heating or cooling, as for example, hot water for domestic heating, or for use in absorption chillers for cooling. While the original demonstration plan called for capture of waste heat and provision of this heat to the local site, no data was captured regarding this aspect of the system. The reason for this is twofold: 1) Edwards AFB did not want have any heat fed to their buildings (they do not require heat during standard operations, and 2) the instrumentation that was put in place to capture heat generation data in lieu of plant-side heat capture was defective. In the interest of time and funding, the decision was made to not focus effort on this aspect of the effort.

3.5 CARBON FOOTPRINT

This performance objective was to reduce the carbon footprint using gasification of solid waste as compared to the disposal of solid waste into the landfill. Active landfills, in California and other states, are being targeted as sources of greenhouse gases, and any diversion of waste from these landfills will result in the reduction of greenhouse gases on the environment. The metric was the life cycle reduction in the carbon footprint as a result of the gasification of combustible solid waste compared to landfill methane generation created by the disposal of solid waste into the landfill. The greenhouse gas (GHG) impacts of various MSW management strategies (source reduction, recycling, composting, combustion and land filling) are given in [17], together with life cycle GHG emission for 21 different MSW components (metals, glass, plastics, paper products, wood products, food discards, and other items). Combustion (gasification) of MSW with energy recovery in the GEM WEC system results in avoided CO_2 emissions. The electricity produced by a WEC plant displaces electricity that would otherwise be provided by an electric utility power plant. The electricity produced by a WEC plant reduces utility CO_2 emissions because most power plants burn fossil fuels and emit CO_2. The combustion of MSW results in emissions of CO_2 and N_2O; however the burning of biomass sources, such as paper products, is not counted as a GHG because it is biogenic. The combustion of lumber, fiberboard, and food discards has small negative GHG emissions, while the gasification of plastic produces positive net GHG emissions. CH_4 and CO_2 are produced from the landfilling of MSW because of

anaerobic degradation. The data required to calculate the metric were the composition of the solid waste (in weight percent), life cycle greenhouse gas emission factors for land filling and gasification for each material found in the solid waste (from [17]), and the flow rate of solid waste flow entering the GEM WEC system.

3.6 AMBIENT AIR QUALITY

This performance objective was to ensure that the GEM WEC system meets the California Air Resources Board (CARB) ambient air quality emission standards for off-road large spark ignition engines (> 19 kW_e, > 1 L displacement) utilizing liquid or gaseous fuels [18]. Emission standards are required to reduce greenhouse emissions, attain and maintain healthy air quality, and protect the public from exposure to toxic air contaminants. Because California had an air quality regulatory agency prior to the passage of the Federal Clean Air Act, other states are permitted to follow the California standards, or the Federal standards, but not set their own. Table 3 lists the emission standards for the Federal Clean Air Act [19] and CARB [18]. The emission standards for California are generally more restrictive for HC + NO_x and generally less restrictive for CO. The emission standards were set for liquid fuels, natural gas and alcohols, but not for producer gas from a gasification system. The metrics used to assess the success of this objective were the HC (hydrocarbon) + NO_x emissions and the CO emissions from the electric generator engines. The data required to calculate this metric were the HC, NO_x and CO concentrations in the engine emission, the flow rate of the producer gas, the flow rate of the air mixed in with producer gas, and the electric output of the generator. The criteria used to determine success of the Demonstration for this performance objective were the CARB emission standards.

Table 3 Emission standards for off-road large spark ignition engines (> 19 kW_e, > 1L displacement

	CARB [17]		**Federal Standards [18]**	
	HC + NO_x, g/kWhr	CO, g/kWhr	HC + NO_x, g/kWhr	CO, g/kWhr
Steady state testing	0.8*	20.6*	2.7*	4.4*
Transient testing	0.8*	20.6*	2.7*	4.4*
Field testing	3.8*	6.5*	3.8*	6.5*
* not to exceed the values listed				

3.7 PAYBACK PERIOD

This performance objective was to estimate the payback period for the GEM WEC system. The payback system is the period of time required for the return on an investment to repay the original investment. In the broadest sense, the payback period for the GEM WEC system is the purchase price divided by the annual cost savings associated with the generation of energy (electricity and heat) by the GEM WEC and the reduction in the solid waste transported to and ultimately disposed of in an on-site landfill. Labor and costs associated with installation, operation, maintenance and periodic equipment replacement of the system must be subtracted from the annual cost savings to further modulate the payback period. The metric used to assess

success of this objective was the payback period. The criteria used to determine success of the Demonstration for this performance objective are less than 5 years for a three-ton per day system.

3.8 SYSTEM ROBUSTNESS

This performance objective related to the reliability of the GEM WEC system in terms of its ability to operate with limited system failures and with a minimum of maintenance. System failures lead to increased operating downtimes and the inability to optimally generate on-site energy and reduce the solid waste processed by the WEC system, resulting in a longer system pay back times. Equipment maintenance is required to ensure that all of the parts of the GEM WEC system are functioning according to specification and in a reliable manner. Excessive maintenance results in higher operating costs and longer system payback times. The metric used to assess the success of this objective was the number of hours the system operates during the day and the number of hours per month required to maintain the GEM WEC equipment. The criteria used to determine success of the Demonstration for this objective relative to system failure was that the GEM WEC system operates more than 7 out of 8 hours per day for 8/5 operation and operates more than 22 out of 24 hours for 24/7 operation. The criterion for system maintenance was no more than 8 hours per month down time for maintenance.

3.9 EASE OF USE

This performance objective was to qualitatively assess the ability of technician level personnel to operate the GEM WEC system and to determine if a single technician can operate the system. Extensive operating labor increases both the operating costs and the payback period. Currently at Edwards AFB, metals and glass are segregated from the municipal solid waste and the resulting waste is baled and disposed in the landfill. For the Demonstration, metals and glass were also segregated and the unconsolidated solid waste was fed into the GEM WEC system by a fork lift with a hopper. The same personnel that prepare the solid waste for disposal in the landfill at Edwards AFB would prepare the solid waste for use in the GEM WEC and dispose of the bottom ash and fly ash generated by the gasifier. Aside from the personnel handling the solid waste, the GEM WEC system is designed to be operated routinely with an automatic control system requiring minimal supervision by technician level personnel.

3.10 AUTOMATIC CONTROL SYSTEM

This performance objective was to qualitatively evaluate the ability of the control system to control the GEM WEC operations from remote and on-site locations and to provide seamless network integration from all field units to IST Energy’s headquarters in Waltham, MA. The control system for the GEM WEC system is responsible for the integrated electronic operation of the GEM WEC system. In addition to controlling the GEM WEC operations, the control system was to monitor the GEM WEC performance, archive operations data, perform operational procedures, and determine the appropriate course of action in the event of system malfunction. Precise monitoring of material flow and the continuous chemical conversion process is necessary in order for waste material to be efficiently converted into electrical energy. The control system was to make slight adjustments in various flow parameters to maintain optimum processing

conditions for waste to energy conversion. During the Demonstration, the GEM WEC system was to be operated by on-site personnel and by personnel at IST Energy's headquarters in Waltham, MA. Operating data (pellet flow rate, moisture content of solid waste and pellets, producer gas concentrations, electric generator output, parasitic energy loss, etc.) were to be collected for each of the Demonstration runs and printed out for analysis. The extent of hands-off operation of the GEM WEC system was to be entered on the computer log during 8x5 and 24x6 operation. Deficiencies in the ability of the control system to monitor and control the operation of the GEM WEC operation were to be recorded.

3.11 SINGLE POINT SYSTEM FAILURES

This performance objective was to qualitatively assess the reliability of key system components and the consequences of their failure. Single point system failures will result in (a) excessive down times, a loss in capacity and an increase in the payback period and (b) significant capital equipment replacement and maintenance costs. Failure mechanisms for each of the major components in the SWP, gasifier and power generation systems were to be identified and probabilities for failure estimated. The time and cost to obtain replacement parts and the time to replace the parts in the GEM WEC system were to be estimated for each of the components. A listing of critical replacement components having the most impact on system down times and equipment replacement costs were to be compiled and inventoried for shipment with the GEM WEC system.

4 FACILITY/SITE DESCRIPTION

Edwards AFB volunteered to serve as a host site for the Demonstration program. This site provided conditions anticipated to be typical to those found on other DoD sites. The solid waste, exclusive of construction and demolition waste, is generated by both DoD and civilian employees and is generally typical of DoD installations throughout the United States. All DoD installations have extensive paper, plastic and metal recycling operations. The Edwards AFB solid waste that goes to the landfill consists of waste generated from on-site living facilities, as well as from industrial facilities on the base. The waste from the on-site living facilities is similar to waste collected from municipalities with extensive recycling operations.

The Edwards AFB active landfill is rapidly reaching full capacity, and strict regulatory requirements make expansion prohibitively costly and time consuming. A vertical expansion of the landfill is currently being sought, but any additional capacity gained from the expansion, without strict management and budgeting of overall volume, will quickly be filled. WEC projects are desirable in that they preserve valuable landfill space through waste diversion, and they provide a source of significant cost savings through onsite power and heat generation from a readily available, no cost feedstock. Edwards AFB also anticipated that the GEM WEC system could be used to treat solid waste already land filled to reduce the costs of maintaining and operating the landfill. In addition, active landfills in California and in other states and are being targeted as sources of greenhouse gases and any diversion of waste from these landfills will help reduce the greenhouse gas impact of the landfill upon the natural environment.

Prior to processing the solid waste for disposal into landfills, the solid waste is dumped on the tipping floor and hazardous waste and aerosol cans are removed for disposal into restricted areas, and metals and glass items are removed for recycling. The resulting solid waste is baled for disposal into the base landfill. With the installation of the GEM WEC system, the solid waste will be converted to energy and only 5% of the solid waste will be disposed of in the on-base landfill. Removal of metals and glass prior to conveyance to the GEM WEC system or during solid waste processing will be required at DoD installations to minimize system breakdown.

Table 4 lists the number of DoD installations throughout the world that generate the range of waste flows shown in the first column [20]. The waste flow was calculated by adding the DoD and civilian personnel found in [20] for each DoD installation and assuming that each person generates 4.5 lbs of waste per day. As noted in Table 4, there are just over 2.9 million personnel generating an estimated 6,612 tons per day. The daily waste flows are relatively small compared to waste treated at municipal facilities and are conducive for treatment by the GEM WEC system.

Edwards AFB provided the necessary infrastructure to support the Demonstration. The GEM WEC system was placed on a concrete pad provided by Edwards AFB near the baler building and recycling buildings (Section 4.3.6), (a) allowing easy access to the solid waste as feedstock for the GEM WEC system, (b) providing direct access to the electric grid at Edwards AFB by installing an electric panel on the recycling building, and (c) allowing easy access for heating the offices in the recycling building.

Table 4 Number of DoD bases generating specific ranges of waste flows

Waste Generated*, tons/day	No. DoD Bases	Total DoD and Civilian Personnel
3-5	110	194,380
5-10	59	179,320
10-20	74	468,030
20-50	63	1,337,150
>50	21	759,850
Total	327	2,938,730
* Assuming 4.5 lbs/day waste generated per person		

4.1 FACILITY/SITE LOCATION AND OPERATIONS

Edwards Air Force Base, one of the largest U.S. Air Force airbases in the United States, is located approximately 100 miles northeast of Los Angeles, CA in the Mojave Desert, and encompasses 301,000 acres (121,805 hectares) [21]. Most of Edwards AFB is in Kern County, with small portions in San Bernardino and Los Angeles counties (Figure 3). The largest features of Edwards AFB are the Rogers and Rosamond dry lakebeds that have served as emergency and scheduled landing sites for many aerospace projects. Edwards AFB has the world's longest runway and houses the Air Force Flight Test Center (AFTCC) and the National Aeronautical and Space Administration's Dryden Flight Research Center. The Air Force Research Laboratory maintains a rocket engine testing site for testing full-size rocket engines, engine components, and liquid and solid propellants. North Base (Figure 3) is the site of the Air Force's most secret test programs at Edwards AFB. Edwards AFB is currently operated and maintained by the 95th Air Base Wing as a part of the Air Force Materiel Command.

The landfill is operated by the AFTCC. Day-to-day operations at the landfill are the responsibility of the AFTCC 95th Air Base Wing and the Civil Engineering Directorate (95 ABW/CE) [225 N. Rosamond Boulevard, Building 3500, Edwards AFB, CA 93524, (661)-277-2910]. The Environmental Management Division (95 ABW/CEV) [5 East Popson Avenue, Building 2650A, Edwards AFB, CA 93524, (661) 277-1401] is responsible for regulatory aspects of the landfill. The landfill is located in the Kern County portion of Edwards AFB about 1.3 miles north of the Edwards AFB family housing area (Figure 3). The landfill is accessed from Landfill Road, which is located near the intersection of Yeager Boulevard and Forbes Avenue. The facility has no formal street address.

Figure 4 shows the existing landfill site boundaries and facilities. The landfill is located entirely on federal land and is surrounded by federal lands owned and managed by AFTCC. The landfill property is approximately 4,000 feet (1220 m) long and 2,000 feet (610 m) wide. It is roughly rectangular in shape with the longer dimension trending northwest to southeast and is narrower at the northwest side. The total site area is 137 acres (55 hectares), which includes 60.5 acres (24 hectares) for disposal of waste. The remaining 76.5 acres (31 hectares) includes an area for a recycling operations center, a 4-acre (1.6-hectares) composting facility/grinder operation, a baler building, weigh scales, and the landfill office.

The existing limits of waste placement are shown in Figure 4. There is some buffer area between the limits of waste placement and the permitted property boundaries on the southwest and northwest portions of the site. On the southeast and northeast portions of the site, the limits of waste placement extend close to the boundary, with the final cover side slopes extending to the site boundary.

4.2 FACILITY/SITE CONDITIONS

The demonstration was held at the existing landfill facility between the baler building (Building 7996) and the recycling operations center (Building 7998) shown in Figure 5 [21]. This section describes the current relevant operations at the Edwards AFB landfill demonstration test site, their potential impact on the demonstration, and the proposed balefill operation for the demonstration.

4.2.1 Waste Disposal at Edwards AFB

Waste is disposed of at the landfill using two methods: above-grade balefill and area fill. Several active faces are present to provide operational flexibility with balefill, area fill, or combined methods of disposal. A recycling operations center and composting facility are also operated at the landfill. The majority of residential and commercial waste is collected by commercial haulers. Access is also provided to base personnel/residents in privately owned vehicles. Construction and demolition waste (CDW) is trucked to the landfill by private construction contractors working on the base. The landfill is accessed via a driveway on Landfill Road. Daily trash generation is approximately 18 to 30 tons/day. The landfill is operated 5 days during the week from 6:30 AM to 4:30 PM and on Saturday from 7:30 AM to 10:30 AM. Trash is not generated on the weekends.

4.2.2 Balefill Operations

For balefill operations, base contract haulers deliver residential and commercial waste to the baler building (Figure 6) after passing the weigh scales and load inspection [21]. The trucks back into the baler building and dump their loads on the tipping floor in front of the conveyor pit for the baler (Figures 7 and 8). The waste is back-dragged with a loader into thin lift so it can be inspected for hazardous waste, aerosol cans, and other prohibited items. These items are removed if they are detected by the loader operator. Metals and glass items are also removed for recycling. The conveyor is then loaded using the loader. Once the waste is on the conveyor belt, it is transported to the baler feed chamber (Figure 8). Finished bales are created approximately once every 5 minutes, providing the waste is continuously fed into the chamber. The finished bales are ejected from the baler for transport to the balefill. The bales are secured by wires (Figure 8). The finished bales measure approximately 31”x 46”x 61” (79 cm x 117 cm x 155 cm), or 50.3 ft^3 (1.43 m^3), and weigh approximately 1,700 lbs (770 kg). The density of the bales is approximately 34 lb/ft^3 (540 kg/m^3). Water is squeezed out of the solid waste during baling. The moisture content of the bales was not been determined.

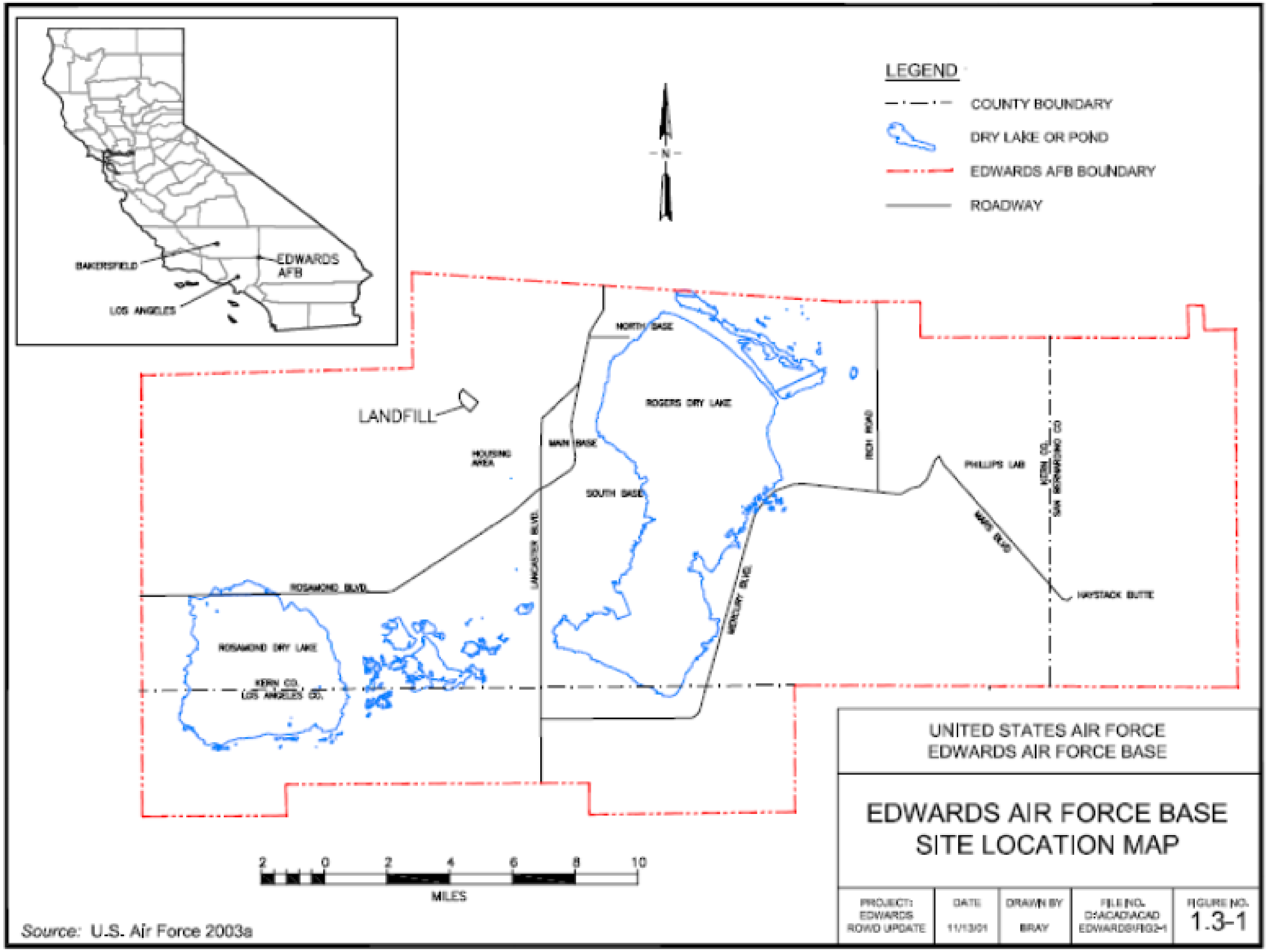


Figure 3 Edwards Air Force Base site location map

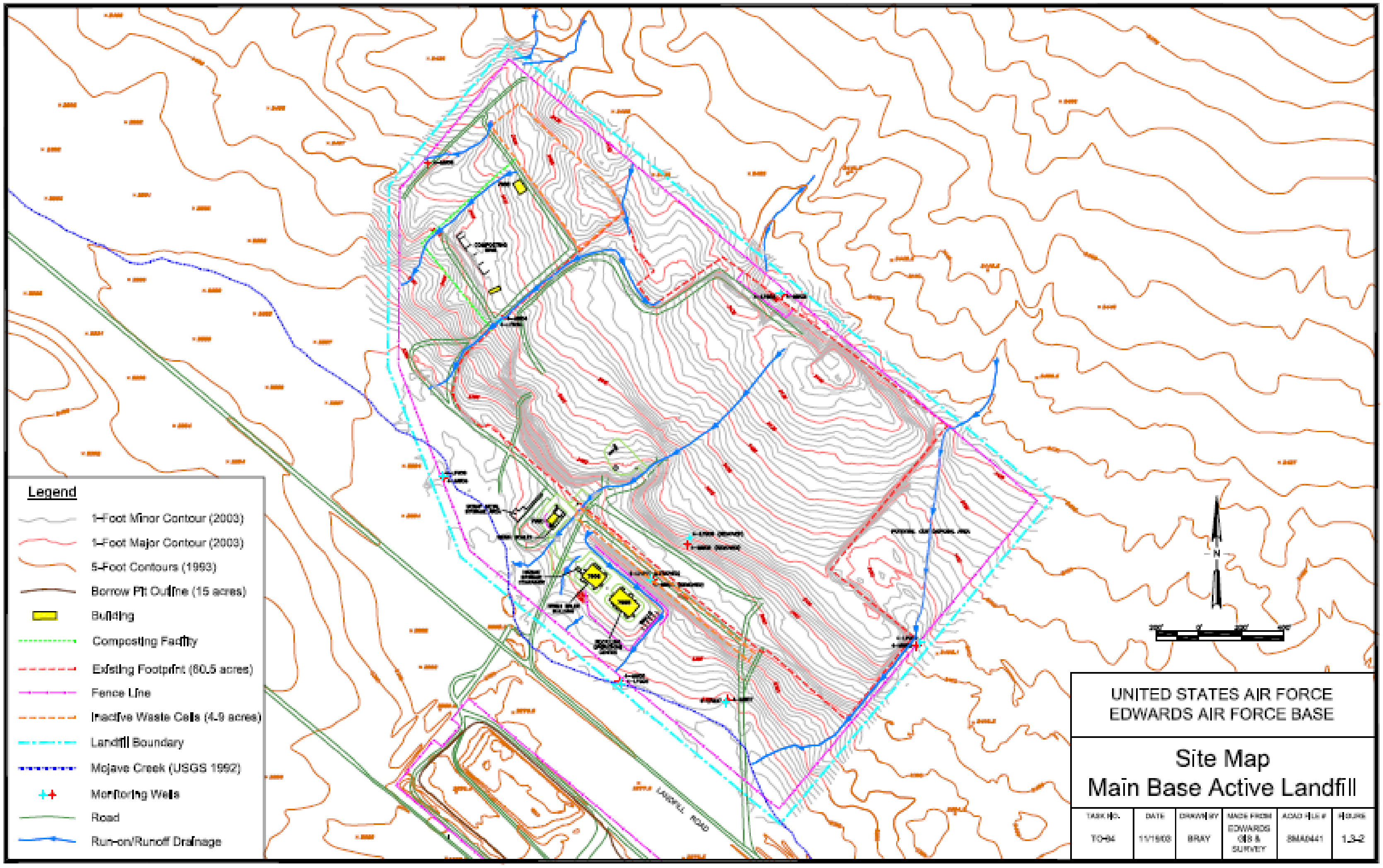


Figure 4 Site map; main base active landfill

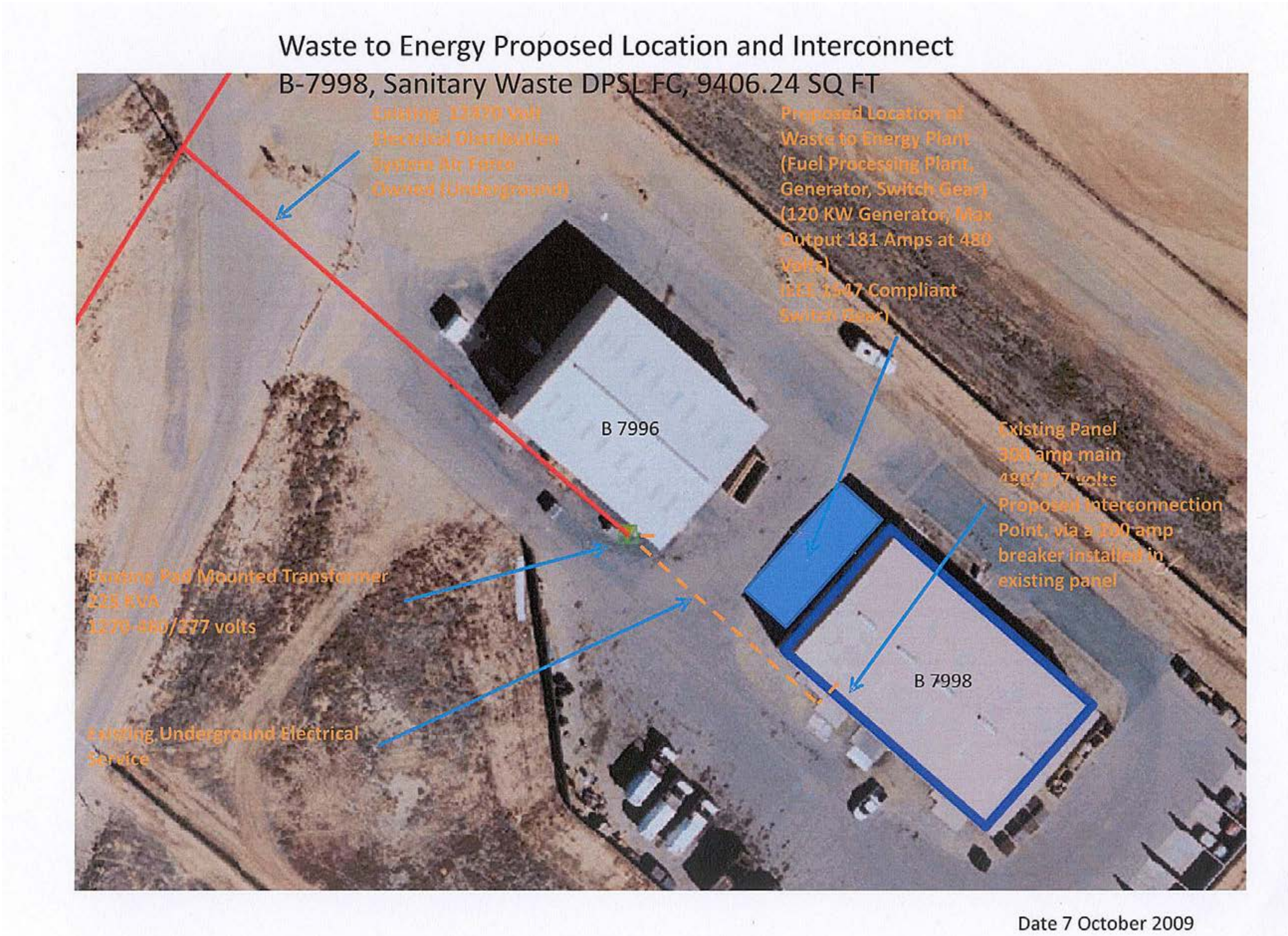


Figure 5 Location of demonstration site

After enough bales are created to fill a dump truck (approximately six bales), they are transported to the balefill. The dump truck is unloaded at the active face of the balefill and the bales are stacked using either a loader or a forklift. The bales are stacked on the active face to eliminate voids within the cell that may harbor rodents. No waste is stored on the tipping floor overnight, which minimizes odor and vector problems at the site. Waste remaining the bale chamber of the baler at the end of the day may be stored in the chamber until the following day.

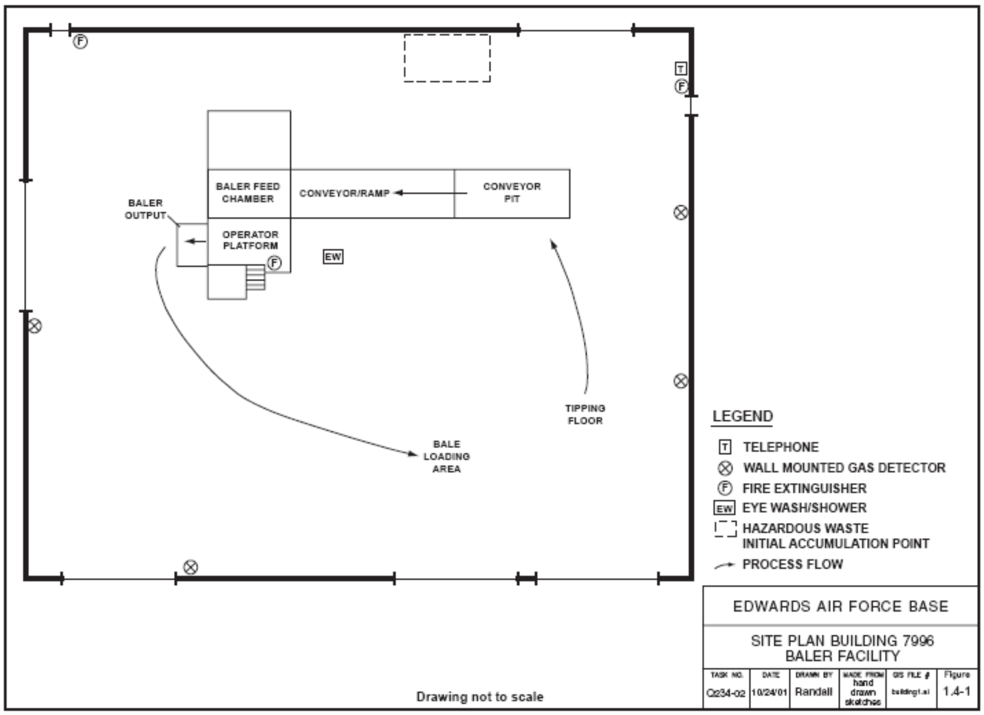


Figure 6 Process flow diagram for baler facility (Building 7996)


Figure 7 Conveyor pit for baler

Figure 8 Baler

Figure 9 Baled solid waste secured by wires

Base residents may unload waste in the baler facility by driving their vehicles onto the tipping floor under the direction of the baler facility staff. Waste is manually unloaded on the tipping floor for baling.

4.2.3 Area Fill Operations

Trucks and private vehicles carrying CDW and residential and commercial waste not to be baled are directed in the active area fill location after inspection and weighing at the entrance gate. Unloading of the waste is confined to as small an area as practical. Unbaled waste material is normally deposited at the toe of the landfill. The unbaled and CDW waste delivered to the active face is spread and compacted in layers with repeated passages of landfill equipment to eliminate voids within the cell that may harbor rodents. The loose layer does not exceed a depth of approximately 2 feet (0.6 m) before compaction. Spreading and compaction are accomplished as rapidly as practical.

4.2.4 Operations Center

Recycling is currently conducted on-base at the recycling operations center (ROC). The ROC is located on the south boundary of the landfill, east of the main entry gate, adjacent to and east of the baler building (Figure 5). Recyclable materials are delivered to the ROC from a residential curbside collection program, an industrial area collection program, individual drop-offs by base personnel in privately owned vehicles, and a landfill screening program. Materials currently accepted included aluminum, steel, glass, plastic (No. 1 through No. 7), mixed paper, newspaper, cardboard, and non-automotive lead/acid and household batteries. Materials are sorted at the ROC using a combination of mechanical and manual separation techniques.

4.2.5 Composting Facility/Grinder Operations

The green waste compositing facility and grinder operation are located on a 4-acre (1.6 hectacre) parcel of land within the boundaries of the landfill. The site is located outside the areal extent of the waste disposal area. No buried waste exists beneath the composting facility area. The composting facility accepts green waste including leaves, grass clippings, tree trimmings and other green waste from the residential area on base. It also accepts landscaping green waste from the base industrial areas. Untreated wood, plywood, pallets and any wood suitable for grinding is accepted from construction contractor operations on the base. Materials that are not accepted included metals, palm fronds, yucca or cactus clippings, oleander trimmings and hazardous materials of any type. Contractor packer trucks from the residential curbside collection program, base landscape contractor vehicles, and private vehicles carrying feedstock are directed to the composting facility/grinder operation after inspection and weighing at the entrance gate.

Feedstock delivered to the composting facility/grinder operation is segregated into five categories: grass clippings, leaves, tree trimmings, wood debris and pallets. Green waste and wood waste are processed separately through a grinder to create green waste mulch and wood waste mulch, respectively. The wood waste mulch is stockpiled for approved beneficial use as cover, erosion/dust control material, slope stabilization material, mulch, soil amendment, or compost feedstock. Green waste mulch is mixed with other materials and used as compost feedstock. The composting process is conducted to meet all the requirement of Title 14 of the California Code of Regulations [22].

4.2.6 Demonstration Site

The demonstration was held at the landfill facility between the baler building (Building 7996) and the ROC building (Building 7998). Building 7998 is approximately 100 feet (30.5 m) from the baler building. Situation of the demonstration activity at this site made good logistical and workflow sense at the time of selection, but did require some preparation prior to installation of the equipment. Specifically, a concrete pad was installed to support the system, a chain-link fence was installed to provide security and safety, and an electric panel at the site was repaired/upgraded. The 400A-480/277V weatherproof electrical panel with a main circuit breaker was mounted on the outside of Building 7998 adjacent to the installation of the GEM WEC system. There were two breakers on the new panel: one 125 A, 4-pole (3 phase w/shunt trip), 480 V breaker and one 200A, 3 pole, 480V breaker. A trench for conduit and wire was also run from the transformer outside of Building 7996 to near Building 7998 (Figure 10). The original plan called for a bi-directional meter to be installed before the switchboard with a connection to the pre-existing transformer but this task was not completed.

In addition to generating electricity, the GEM is designed to export heat. However, ROC building also wasn't retrofitted to accept the waste heat from the GEM WEC due to general sentiment at Edwards AFB that heat collection was not of interest, and also in order to expedite the start of the demonstration. Figure 10 is a graphic representation of the rear view of the GEM WEC system and shows the plan for the heating conduit that was originally conceived to transport the waste heat from the GEM WEC to the ROC building.

The GEM WEC system was placed on a concrete pad against one wall of Building 7998 and enclosed with a gate (Figures 12 and 13). Dimensions of the concrete pad and fence are shown in Figure 14. Figure 15 shows the site prior to modification, and Figure 16 shows work in-progress. A photograph of the GEM installed per the plan is provided in Figure 17. The solid waste was transported to the GEM with a front end loader.

Figure 10 Side view of GEM system

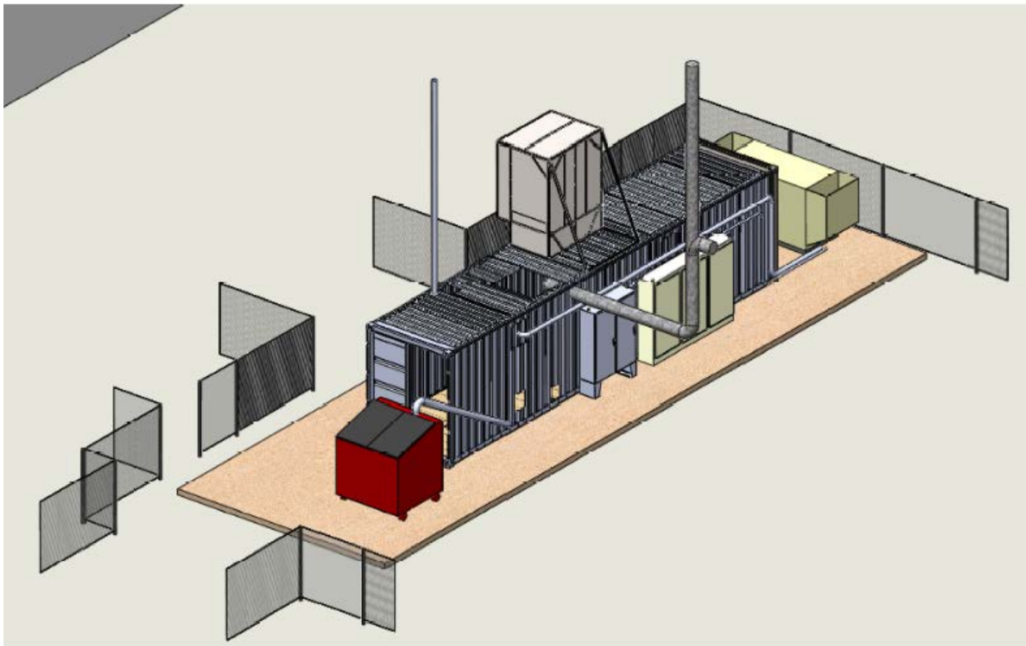


Figure 11 Rear view of GEM system showing heating conduits

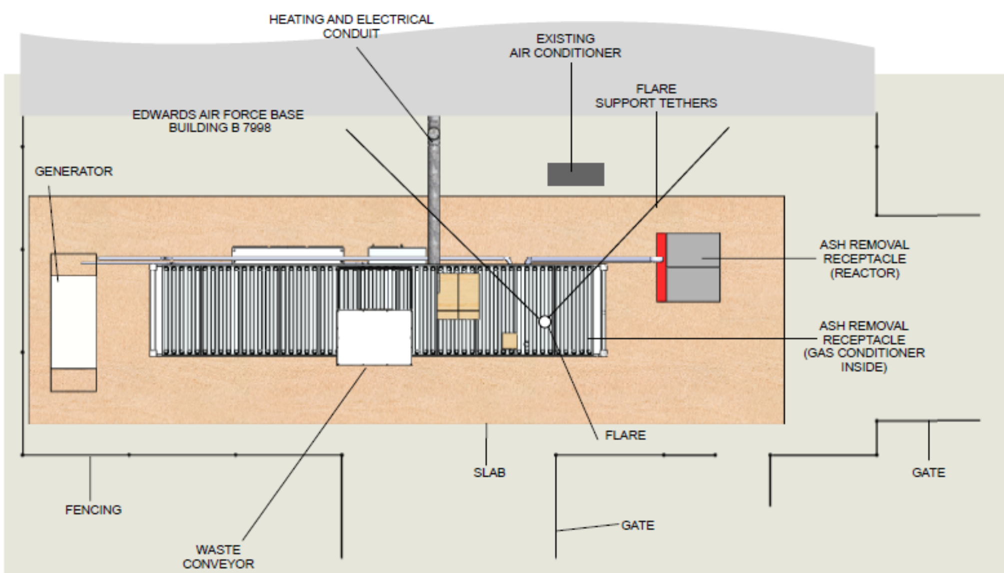


Figure 12 Layout of demonstration site

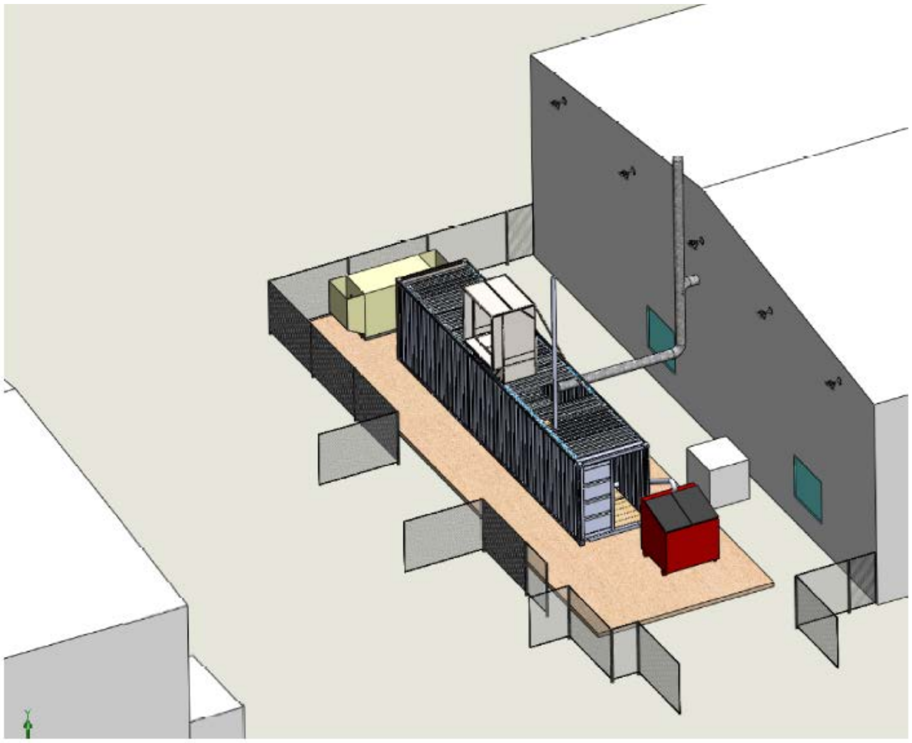


Figure 13 Graphic representation of GEM WEC system at demonstration site

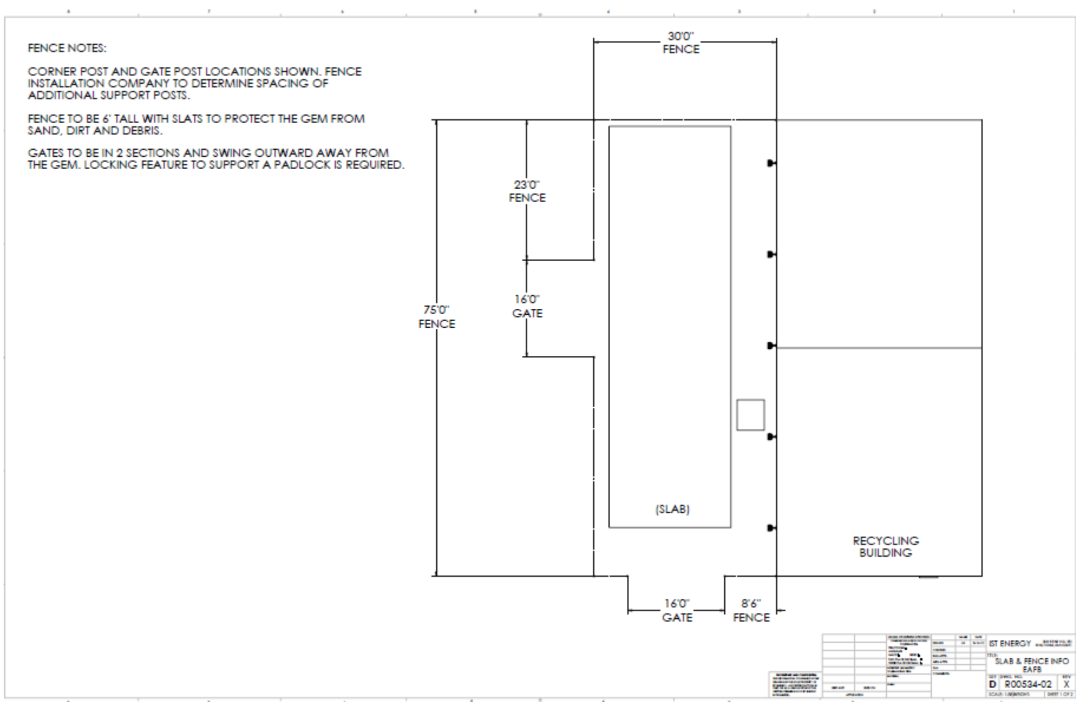


Figure 14 Dimensions of concrete slab and fence

Figure 15 Site of GEM installation at Edwards AFB prior to site preparation

Figure 16 Framing for the concrete slab

Figure 17 Front view of GEM installed at Edwards Air Force Base

5 TEST DESIGN

5.1 CONCEPTUAL TEST DESIGN

For the purposes of the assessment of the demonstration, the GEM was viewed as the independent variable (although, truly, its performance was dependent upon the waste stream it processes). Specifically, the key outcome of the demonstration was dependent upon the performance of the GEM. As a result of the demonstration, relationships between the implementation of the GEM and key macro parameters were drawn (i.e. as described in the Performance Objectives). The basis for funding this effort was that the GEM would have a marked positive impact on operations as measured by the performance objectives. The expectation was, therefore, that this would be proven out as a result of the demonstration.

Demonstration and evaluation of the GEM WEC system had five operational phases. These are summarized, along with the local monitor/responder responsible for each, below:

- ***Ship/Installation*** (Co-PI, Edwards Air Force Base). The first phase of the demonstration commenced upon completion of site preparation and confirmation of all required permits and licenses to operate at EAFB. Site preparation involved installation of a concrete pad to support the system, installation of safety features (security fence), and updating of electrical connections to support the power transfer to and from the system. Permits required included both approval from air emissions and solid waste stakeholders from the State of California, as well as a license from the base commander to operate.
- ***Initial Start-up, Commissioning and Training of Edwards AFB Staff*** (Lead Engineer, IST Energy). The start-up and commissioning phase is required to ensure the system is in proper working order post-shipping and also to establish processing baselines for the local waste stream. Training of staff was minimized due to delays in permitting processes and a desire to see a timely conclusion of the demonstration.
- ***Five-Day Weekly (5 days x 8 hour) Operation*** (Lead Engineer, IST Energy). The 8x5 phase was aimed at performing single-shift operation of the system.
- ***Six-Day Weekly (6 days x 24 hour) Operation*** (Lead Engineer, IST Energy). The 24x6 phase was aimed at evaluating the system under the rigors of 24-hr operation for a 6-day working period.
- ***Shutdown and Transfer of Ownership of GEM WEC to Edwards AFB*** (Principal Investigator/Program Manager, Infoscitex). The shutdown and transfer phase entailed decommissioning of the system and return of the site to a state similar to its state prior to the demonstration. Since Edwards AFB opted not to retain the system, it was removed and shipped back to Massachusetts.

The operational phases were designed to evaluate the system from the initial startup, through daily operation, and culminating in the complete shutdown and transfer ownership of the unit to Edwards AFB. Test data, obtained during each operational phase of the Demonstration at Edwards AFB, was used to evaluate the performance objectives of the GEM WEC system. Data sampling points are shown in the process and instrumentation diagram (PID) (Figure 18) and were used for characterizing the individual performance of the solid waste preprocessing and thermal decomposition/energy generation subassemblies, as well as the overall performance of

the GEM WEC system. Cost data was also obtained to estimate realistic life cycle costs of the GEM WEC system. All of the components of the GEM WEC system were controlled by programmable logic controllers (PLCs). A Supervisory Control and Data Acquisition (SCADA) system monitored the entire GEM WEC system and allowed the system operator to change the set points of specific PLCs for individual events, monitor operating conditions, and analyze performance information. Specific details of each major component of the GEM WEC system and the experimental design are provided in the following sections.

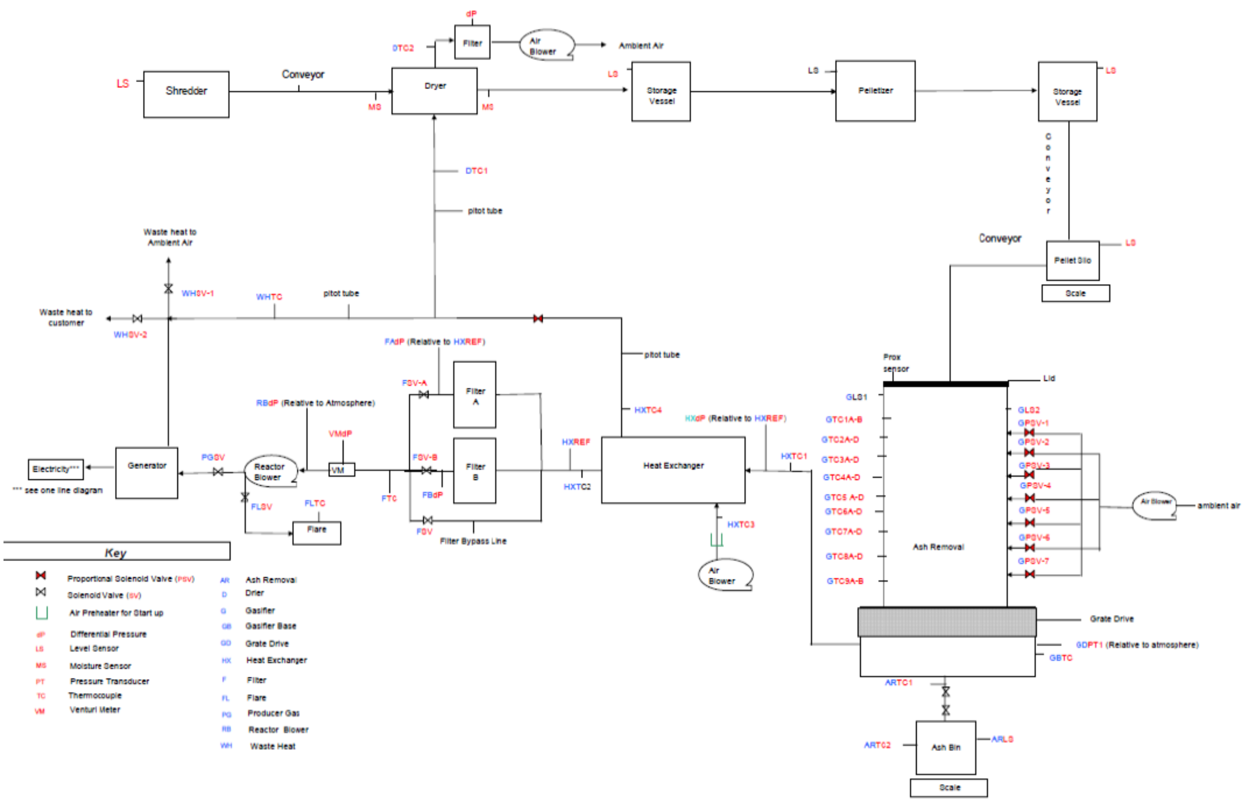


Figure 18 Process and instrumentation diagram

5.2 BASELINE CHARACTERIZATION

The GEM WEC system was developed as the result of two SBIR efforts focused on individual subsystem development (solid waste preprocessor and gasifier) and a privately funded productization effort that focused on maturing the individual subsystems and subsequently integrating them into a containerized process plant with automated controls. Baseline data for the two key subassemblies (solid waste preprocessor and gasifier) are provided in the subsections that follow.

5.2.1 Solid Waste Preprocessing Subassembly

Development of various components of the SWP subassembly was initiated in 2005 under a Small Business Innovative Research (SBIR) program with the Army Research Office [12, 13]. This program was part of a more inclusive program to develop a mobile waste-to-energy system to convert bulk field encampment waste (food, plastic packaging, and paper/cardboard) to

electricity for use in field kitchens. In the Phase I program, a variety of commercially-available equipment was identified for use in the SWP. Experimental trials were run at vendor locations with simulated solid waste consisting of meals-ready-to-eat (MREs) and paper and cardboard to obtain energy usage data and shredded/pelletized waste characteristics (Table 5). Ultimate and proximate analyses of the pellets were carried out by an independent testing laboratory (Table 6). This composition was based on the Force Provider Ft. Polk characterization study without the metal and glass content [14] and was used for all of the SBIR and ESTCP SWP tests, unless otherwise noted.

Table 5 Composition of simulated waste streams based on Force Provider Ft. Polk characterization study [14]

Component	Mass (lbs)	Weight%	Source
Food	210	44.5	MRE food waste
Paper	199.5	42.2	MRE fiberboard cases, MRE packaging, Chinette trays, cardboard
Plastic	63	13.3	MRE packaging, UGR plastic trays, bag liners

Table 6 Ultimate, proximate, and heating value analyses of waste pellets

Analysis	IST Pellets	
	Air Dried	Dry
Proximate		
Moisture, percent	5.3	0
Ash, percent	5.81	6.14
Volatile, percent	77.3	81.63
Fixed carbon, percent	11.59	12.23
Ultimate		
Carbon, percent	49.82	52.61
Hydrogen, percent	6.94	7.33
Nitrogen, percent	0.85	0.90
Sulfur, percent	0.15	0.16
Oxygen*, percent	31.13	32.86
Heating Value		
Higher Heating Value, BTU/lb (kJ/kg)	9178 (21,334)	9692 (22,528)
Lower Heating Value, BTU/lb (kJ/kg)		9004 (20,929)

The results of the SBIR program were used directly for the design of the GEM WEC SWP subassembly. A complete SWP subassembly was assembled; the shredder, drier, pelletizer and control system were integrated together with conveyors. Pellets of various sizes and moisture contents were evaluated in the gasifier and an optimum pellet configuration and moisture content selected for Demonstration testing. The pellet composition was based on the Force Provider Fort Polk characterization ([14], Table 5, Table 6). The pellet size selected was ½ in diameter x 0.6 in long (12 mm dia x 15 mm long) with a density of approximately 30 lb/ft3 (480 kg/m3). Solid

waste from Edwards AFB was received and analyzed (Table 7). Pellets were made from this waste by the SWP subassembly and tested in the gasifier.

Table 7 Composition of simulated waste streams based on EAFB characterization study

Component	Mass (lbs)	Weight %	Source
Food	20.6	30	MSW Landfill
Paper	13.2	19	MSW Landfill
Plastic	12.4	18	MSW Landfill
Cardboard	6.6	10	MSW Landfill
Metal/Glass/Ceramic	15	22	MSW Landfill

5.2.2 Gasifier Subassembly

In 2005, under another SBIR program supported by TARDEC [15], IST initiated the development of a small-scale downdraft gasifier that used pellets produced by the SWP system. A clean, low tar medium BTU producer gas was generated by the gasifier and used to fuel an engine/electric generator. Comminuted and densified fuel pellets were produced from four different food compositions, all of which were typical of solid waste streams generated in the forward field. Samples of each waste-based pellet composition were given to an independent analytical laboratory to determine their fuel and volatile gas content. The volatile content of all four fuel pellets were about the same. Although there were differences in the energy content of each sample, the average energy content was about 9,800 BTU/lb. Equal amounts of the four types of representative pellets were mixed together and manually fed into a laboratory-scale down draft gasifier. The tar composition of the producer gas was measured at a series of operating points and showed that the tar content ranged between 50 to 100 ppm. Gas samples of the producer gas were collected in a Mylar bag and analyzed by gas chromatography. The gas composition was not outside the range of producer gas analyses seen previously, but the gas had more carbon dioxide than usual.

In January 2008, IST Energy was incorporated as a majority-owned subsidiary of IST. Shortly thereafter, a gasifier with a pellet feed rate of 200 lbs/hr (91 kg/hr) capacity (12% moisture content) was designed and fabricated. This corresponds to a 3 ton/day (250 lbs/hr, 113 kg/hr) solid waste feed with a 30% moisture content to the SWP. The gasifier was integrated with a producer gas conditioner, consisting of a heat exchanger and a particulate filter. During start-up, the producer gas was flared to the atmosphere. Pellets were made in the SWP subassembly and manually fed to the gasifier. Pellets using a Force Provider Fort Polk solid waste composition [14] were used throughout the gasifier studies. IST Energy improved the performance and safety of the gasification substantially through several design iterations. These refinements generally resulted in a number of improvements over early generation gasifier performance:

- The pellets move continuously through the gasifier
- The gasifier grate operates continuously and the bottom ash removal rate is 3-5% of the pellet feed rate
- The design values of the pressure drop of the air across the reactor are achieved
- The temperatures throughout the reactor, at a given cross section and through the length of the reactor, reach steady state and are generally consistent from run to run
- Most of the hot spots in the reactor have been eliminated

- When the producer gas conditioner is operated in series with the gasifier, very little ash and tar is found in the heat exchanger
- When temperatures in the reduction zone of the gasifier are in the target range, very little tar is found in the particulate filters

5.3 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

5.3.1 Overall System Description

The GEM WEC system consists of the preprocessing sub-assembly, the thermal decomposition/energy generation sub-assembly and two control cabinets. The solid waste preprocessing and thermal decomposition/energy generation assemblies are capable of being packaged in separate standard shipping containers and operated individually or jointly. When operated individually, the preprocessing assembly processes the solid waste into pellets at one solid waste tipping location and the pellets are transported to another location, where they are gasified and converted into electricity and heat for on-site use. For the Demonstration, the GEM WEC system was shipped to Edwards AFB in an 8’6” wide x 9’6” tall x 40’ long (2.6 m x 2.9 m x12.2 m) International Organization for Standardization (ISO) container.

One side of the ISO shipping container was placed against the recycling operations center (ROC) building at Edwards AFB (Section 4.2.6). The ROC building was 78 feet (24 m) from the baler building where the solid waste was segregated and conveyed to the GEM WEC system for preprocessing and gasification for energy generation. Power output from the generator was tested using a load bank. Waste heat from the GEM WEC system was either used to dry the shred or exhausted to the atmosphere.

The two control cabinets are used for the preprocessing and thermal decomposition/energy generation subassemblies. The control system and the principal components of the subassemblies are discussed in the following subsections.

5.3.2 GEM WEC Control System

The control system is responsible for the integrated electronic operation of the GEM WEC system. Precise monitoring of material flow and the continuous conversion process is necessary for waste material to be efficiently converted into electrical and thermal energy. The control system makes slight adjustments in various flow parameters to maintain optimum processing conditions for waste to energy conversion.

A Supervisory Control and Data Acquisition (SCADA) system monitored the entire GEM WEC system. Most control actions were performed automatically by programmable logic controllers (PLCs) and not by the SCADA system. For example, a PLC controlled the flow of air through the gasification reactor, but the SCADA system allowed the operators to change the set points for the flow, monitor operating conditions, and analyze performance information. The feedback control loop passed through the PLC, while the SCADA system monitored the overall performance of the loop.

The SCADA system can provide the following functions:

- Provides a seamless network integration from all field units to IST Energy's headquarters
- Remotely monitor GEM performance, control GEM WEC operations, archive operations data, determine appropriate course of action, perform operational procedures, and integrate with customer/technical service systems
- Provides customers with the ability to remotely monitor GEM WEC performance, control GEM WEC operations, determine appropriate course of action, and perform operational procedures.

The control system requirements for the solid waste preprocessing (SWP) and thermal decomposition/energy generation subassemblies were divided into a number of sections (see Table 8). A forklift and a self-dump hopper were used to supply solid waste to the GEM WEC system.

Table 8 Control system requirements

Solid Waste Preprocessor	Thermal Decomposition/Energy Generation	
Shredder	Gasifier feeding	Reactor blower
Fluidized bed drier	Grate drive	Flare
Metal separation	Ash removal	Back End Process Line
Dry shred hopper	Secondary air supply	Heat exchanger blower
Pelletizer	Producer gas conditioner	Waste heat
Pellet hopper		
Miscellaneous		

For the Demonstration, the SWP, gasifier and frontend conveyor control systems were integrated and powered from the existing grid and not from the generator.

5.3.3 Solid Waste Feed

The solid waste for the Demonstration was hauled to the baler building, dumped on the tipping floor, and back-dragged with a loader into a thin layer (subsection 4.3.2). The waste was inspected for hazardous waste and other prohibited items; any of these undesirable materials were removed. Metal and glass items were segregated and removed for recycling. Two options for conveying the solid waste to the GEM WEC system were considered. In the first option, the solid waste would be transported to the GEM WEC unit in a front end loader. In the second option, the solid waste would be transported to the GEM WEC unit on a conveyor. For both options, the solid waste would be placed in a dump hopper on top of the ISO container. The dump hopper would be mated with the GEM WEC shredder hopper inside the ISO container, so that the solid waste would fall directly onto the shredder blades. If the conveyor was used, the conveyor would be attached to a solid plate that will be mated to the dump hopper.

For the purposes of the demonstration, the first option was used taking into consideration costs and lead times for construction. Therefore, a front end loader moved the solid waste into a self-dump hopper that mounted on a fork lift (Figure 19). The front end loader transported the waste from the baler building to the GEM WEC unit, where it lifted the self-dump hopper above the dump hopper on top of the ISO container. The fork lift operator remotely opened and rotated the self-dump hopper and unloaded the solid waste into the ISO dump hopper. The self-dump hopper on the fork lift had a weight capacity of one ton and a volume capacity of two (2) cubic

yards (1.5 m^3). A single hopper would carry about 500-540 lbs (227-245 kg) of solid waste. The volume of the GEM WEC shredder hopper and dump hopper on top of the ISO container was a little less than two (2) cubic yards.

Figure 19 Self-dumping forklift hopper

5.3.4 Gasification Reactor

The gasifier is a thermal reactor designed to convert the solid densified material (pellets) into a gas containing the constituent gaseous elements found in the pellets. In gasification, carbon-based feed stocks are converted to a producer gas, comprised mainly of carbon monoxide and hydrogen, after reacting with oxygen in air.

The gasifier used in the GEM WEC system is a downdraft gasifier in which both the solid fuel particles (pellets) and air move in the same direction down through the reactor vessel (Figure 19). Downdraft gasifiers were developed to convert high volatile fuels to low tar gas, which can be used for power generation [23]. Updraft gasifiers, in which the pellets and air move in opposite directions, produce high tar fuels, which are unsuitable for engine operation. In order to avoid the formation of tars, thermal profiles within each zone of the downdraft gasifier must be maintained. Thermal profiles for both the solid core and gas phase are shown in Figure 20.

The solid fuel is fed through the top of the gasifier into the waste/air inlet zone. The pellet flow through the reactor vessel is controlled by the grate drive. Air is drawn through the fuel pellets and the producer gas cleanup system by using the suction of the engine. Fuel pellets pass into the pyrolysis zone from this stage. It is within the pyrolysis or devolatilization stage that initial conversion begins and char is produced. Gas temperatures reach upwards of 1000°C while internal solid core temperatures remain relatively low. About 10 to 20 % of the solid waste remains as charcoal after pyrolysis. The volatiles and some of the char react with oxygen to form carbon dioxide and carbon monoxide, providing heat for the downstream char reduction reactions (see Equation 1). As the pellets are reduced in size and density they travel further down through the gasifier into a char reduction or gasification zone, in which the char reacts with carbon dioxide and steam to produce carbon monoxide and hydrogen (see Equation 2). Both of the reactions are endothermic and occur rapidly at temperatures over 900-1000°C. The cooling effect keeps the gas temperatures in the gasifier from increasing above these temperatures.

Maintaining the desired thermal profile within the char reduction zone via introduction of a secondary air stream is required to control tar content. Secondary air flow is controlled by proportional valves which vary flow based on thermocouples placed throughout the interior of the reactor vessel. This will regulate the total tar content in the producer gas to <1000 ppm.

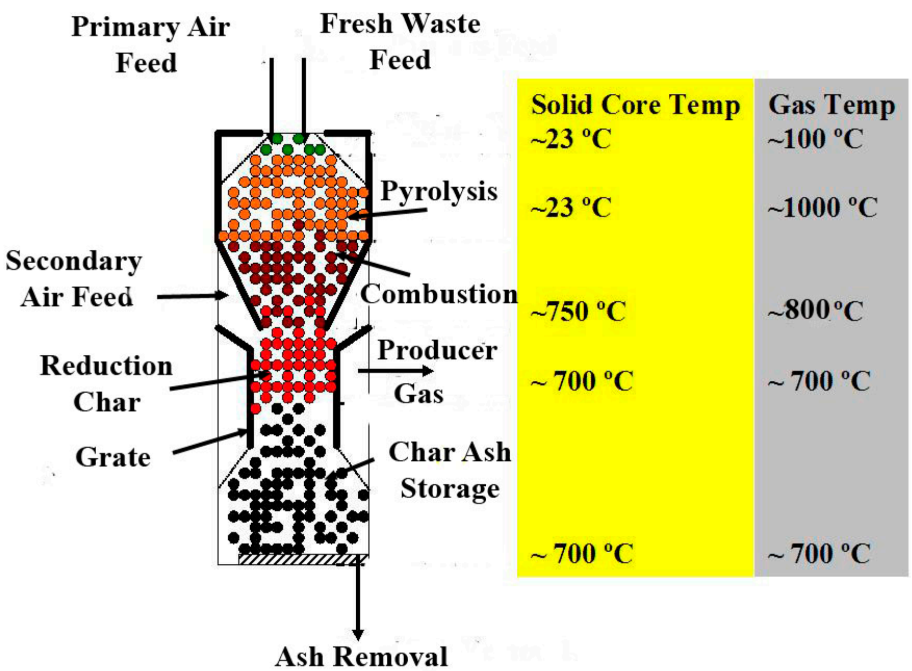


Figure 20 Operational conditions of a low tar downdraft gasifier

$C + CO_2 \rightarrow 2CO$ ....(1)
$C + H_2O \rightarrow H_2 + CO$ ....(2)

5.3.5 Power Generation

Producer gas analysis

TRC Companies, Inc. was contracted to perform the producer gas analysis due to issues with IST's equipment. TRC sampled the producer gas after the reactor blower using a tedlar bag and then had the sample analyzed via gas chromatography pursuant to ASTM D 1945-96 2003. Data pertaining to producer gas analysis is provided in Table 9.

Table 9 Producer gas analysis

Fuel Value (%), Moisture & Ash Free					GCV	
Carbon	**Hydrogen**	**Nitrogen**	**Oxygen**	**Sulfur**	**Btu/lb, dry**	**Btu/ft^3**
13.96	2.22	62.17	21.65	0	2,174.60	167.9

Engine/electric generator

Producer gas provides shaft engine power/electricity generation for small systems, primarily for shaft power generation (to 200 kW$_e$) [23]. Producer gas, derived from the gasification of solid waste and biomass, consists of about 40 percent combustible gases, namely carbon monoxide, hydrogen and methane. The rest are non-combustible and consist mainly of nitrogen, carbon

dioxide and water vapor. The producer gas also contains contaminants, namely condensable tar and acids, that lead to enhanced engine wear and operational problems. The GEM WEC gasifier and producer gas conditioning (Section 5.3.6) systems have been designed to generate a gas with a high proportion of combustible components and a minimum of contaminants.

Low tar producer gas from downdraft gasifiers provides engine shaft power and electricity from a wide variety of biomass fuels. Downdraft gasifiers have a rapid response time so they suitable for powering engines with either varying or fixed loads. Air is drawn down through the gasifier by suction from a blower. A photograph of the diesel engine used in the GEM WEC system is shown in Figure 21. The unit is a 135 kW_e diesel engine that has been modified to accept producer gas from the gasification process. The intake manifold was modified to allow for syngas to enter the engine as well as the fuel injection pump to limit the amount of diesel that is supplied. The engine specifications are given in Table 10.

Producer gas is generated by the gasifier and is cleaned and cooled via the producer gas conditioner. The gas is then directed through valves to the engine unit. Here the gas goes through a final filtration process for particulates and tar. It then gets integrated into the intake manifold with air and passed through a turbocharger to provide 19:1 compression. At the same time the diesel fuel is being introduced into the firing cylinder at a rate of 1.2 GPH to act as a spark plug for gas ignition. As the diesel compresses it will ignite and create a flame front. That flame front ignites the syngas and increases the power output. The power output from an engine operating on producer gas is dependent on the heating value of the combustible mixture of fuel and air which enter the engine during each combustion stroke, the quantity of diesel fuel added, the quantity of combustible mixture which enters the engine during each combustion stroke, the engine efficiency (converting the thermal energy into mechanical energy (shaft power), and the number of combustion strokes in given time period. Typical compositions of the producer gas combustibles generated from the GEM WEC gasifier are CO, 9-10% vol; CH_4,10-11% vol; and H_2, 18% vol. The producer gas heating values corresponding to these compositions are 178-190 BTU/ft^3 (6.63-7.08 megajoules/m^3).

Generator

Engine

Figure 21 Engine and electric generator

Table 10 Electric generator engine specifications

Engine Properties	Value
Engine	In-line, 4 Cycle
Compression ratio Number of Cylinders	9.0: 1 6
Piston displacement	6.8L
Bore and stroke	106 mm x 127 mm
Horsepower (with diesel)	180 hp@ 1800 rpm

Changes in the producer gas composition caused dramatic changes in the engine power. The producer gas composition varied during gasifier operation due to variations in the solid waste composition and gasifier temperatures which would cause a spark ignition engine to misfire and temporarily stop operating if one were used in this instance. Instead with the diesel engine, the energy content of the syngas did not affect normal engine operation. However, the power output was affected. As the energy content of the syngas increased, so did the power output and as the energy content decreased so did the power output.

A best available control technologies (BACT) analysis was performed to determine the best path forward to reduce the production of regulated emissions. As a result, several control technologies were implemented. First, the syngas and air flow rate were controlled to provide enough oxygen to combust both the syngas and diesel. This reduced the amount of particulate matter generated. The engine also had an exhaust gas recirculation system (EGR), which diverted a portion of the engine exhaust back into the intake manifold. This reduced the firing temperature within the combustion cylinder which reduced NO_x production. The last control technology implemented was a catalytic converter. There were numerous systems in series to reduce CO emission levels.

The generator used was a brushless, self-excited, externally voltage regulated, synchronous AC generator that consists of six major components: main stator (armature), main rotor (field), exciter stator (field), exciter rotor (armature), rectifier assembly, and voltage regulator (Figure 21). The stators are stationary components, rotors are rotating components, a field is an electrical input, and an armature is an electrical output. These system components are electrically interconnected, as shown in Figure 22.

One of the objectives of this program was to quantitatively determine if the power quality or quality of the voltage, frequency and harmonics of the electricity generated by the GEM WEC system matched the power quality of the AC power for the site without significant loss of performance or life. Electricity generated by the GEM WEC system was supplied to a load bank due to unresponsiveness on the part of the local utility provider (an interconnection approval is required for grid safety purposes). A switch gear was utilized to prove that paralleling to the grid characteristics is achievable. The parallel switchgear modulates the quality of the generated voltage (magnitude, transients) and the harmonic content of the waveforms to match the site power quality. The load bank was connected to the generator switchgear with logging software for output.

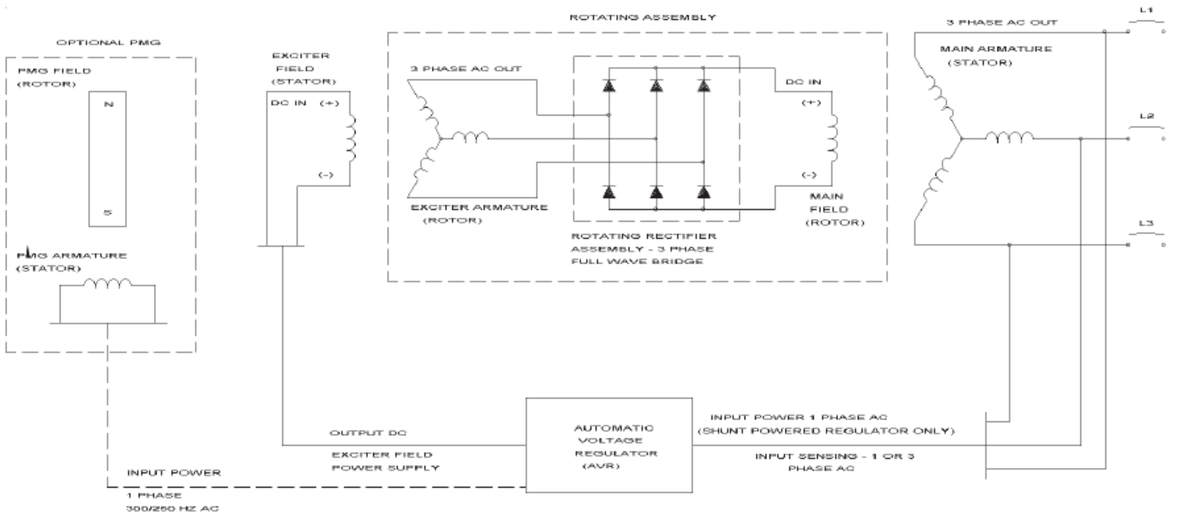


Figure 22 Circuit diagram for GEM WEC generator

Waste heat

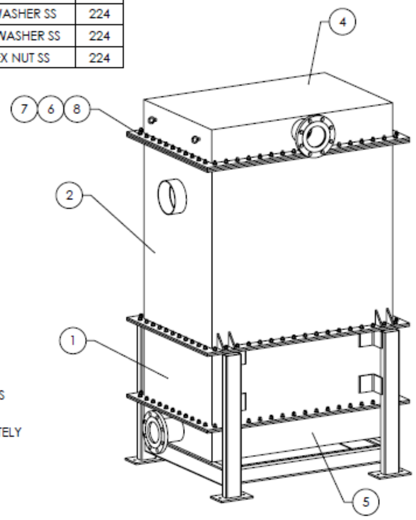
There are two sources of recoverable waste heat that could be used for on-site use, namely the gasifier and the engine/generator. The producer gas exited the gasifier at a temperature of 600°C and was cooled to 80°C through a heat exchanger before entering the engine/electric generator. The cooling air picked up the waste heat from the producer gas. Part of this waste heat was used to dry the shredded waste in the drier (Section 5.3.5) and part could have been used for on-site heating applications.

Waste heat was also generated as the engine/electric generator produces electricity. This waste heat could have been combined with part of the waste heat from the gasifier. As discussed in Section 4.2.6, building 7998 was not retrofitted to accept waste heat. If it were, a portion of the combined waste heat would have been used to heat building 7998. However, as the host site did not want heat fed to their facility, all of the waste heat generated was radiated to the atmosphere.

5.3.6 Producer Gas Conditioner

The purpose of the producer gas conditioner is to prepare the gas stream exiting the gasifier for use downstream. It consists of three distinct pieces of equipment: 1) a cyclone, 2) a heat exchanger (Figure 23), and 3) a set of baghouse filters to be used in parallel (Figure 24). The cyclone removes larger particulates from the producer gas. The heat exchanger cools the producer gas from the gasifier in order to extract the waste heat for other applications. The baghouse filter removes tars, fly ash, and other smaller particulates from the producer gas.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GP00245-01_01	SUPPORT BASE & EXPANSION JOINT	1
2	GP00245-01_02	AIR CHAMBER	1
3	GP00245-01_03	GAS TUBE ASSEMBLY	1
4	GP00245-01_05	GAS OUT PLENUM	1
5	GP00245-01_04	GAS IN PLENUM	1
6	-	7/16 FLAT WASHER SS	224
7	-	7/16 LOCK WASHER SS	224
8	-	7/16-14 HEX NUT SS	224



NOTES:

WHEN WELDED AND ASSEMBLED, THIS ASSEMBLY MUST BE AIR TIGHT.

THIS ASSEMBLY WEIGHS APPROXIMATELY 2900 POUNDS.

Figure 23 GEM WEC shell and tube heat exchanger

Figure 24 GEM WEC baghouse filters

The producer gas enters the top of the cyclone propagating in a helical pattern beginning at the top (wide end) of the cyclone and ending at the bottom (narrow) end before exiting the cyclone in a straight stream through the center of the cyclone and out the top. Larger (denser) particles in the rotating stream have too much inertia to follow the tight curve of the stream, and strike the outside wall, then falling to the bottom of the cyclone where they can be removed. An airlock valve system is used at the bottom of the cyclone to limit any air dilution of the product gas. At the outlet of the valve system, a transition hopper coupled with a vacuum unit deposits the

particulates in a storage receptacle for removal at a later point in time. The cyclone unit was sized based on measured flow rates of the producer gas.

The shell and tube heat exchanger consists of tubes through which the hot producer gas flows. The cooling air flows outside the tubes but inside the shell of the heat exchanger. Through this process, heat is transferred from the producer gas to the air through the tube walls.

The hot producer gas enters at the top of the heat exchanger and exits at the bottom. The air enters the heat exchanger at the face opposite the air outlet on the same level as the producer gas outlet and exits at the top of the heat exchanger. The heat exchanger flow paths are therefore in cross flow, which produces a more efficient transfer of heat.

The cooled producer gas enters into the baghouse filter from the bottom and exits at the top. The unit is comprised of a rectangular chamber housing nine (9) filter bags. Fly ash is powder-like and is filtered out of the producer gas through the filters. The fly ash is defined as particles that are entrained in the gas stream and have to be removed through a filtration process. The fly ash forms a cake on the filter bags over time. A differential pressure reading indicates when the bags are full of material and require cleaning. When such conditions are reached, producer gas flow is switched over to the alternate, parallel baghouse unit while the original unit gets cleaned using a backpulse system to remove the fly ash from the filter bags. After each pulse, the fly ash gets collected in drums located beneath the baghouse unit. Cleaning is an automated process.

5.3.7 Bottom Ash Removal

Bottom ash is defined as the ash and char that is passed through the reactor grate system and is too large to be entrained in the product gas stream; it is granular in nature. The bottom ash removal system (Figure 25) starts with a hopper that collects the bottom ash right below the grate system. A pair of high temperature screw augers continuously conveys the material to an airlock valve system to limit any air dilution of the producer gas. The valve system repeats a 30 second loop in which the top valve opens for three (3) seconds and then closes followed by the bottom valve opening for three (3) seconds and then closing. There are limit switches on each valve to ensure that they both are not open at any given time. The ash passes through each valve section by gravity and collects in a steel drum. The drum itself is contained within a larger steel structure which serves as secondary containment for any reason the steel drum and controls fail to keep the ash within the primary container. This container has doors to access the drum, however, during operation, the doors are closed. The primary drum has a lid system that has several control features. First, the lid has a vent to relieve any pressure that may occur as the ash/char displaces the air in the container. The lid system also has an ultrasonic level sensor that continuously monitors the height of the ash in the container. This system provides a failsafe method to ensure the ash receptacle is not overfilled. Once the ash reaches a level where there is less than 4 hours of operation before the receptacle is full, a caution alarm is set with instructions to switch ash receptacles. When the operator acknowledges the alarm, the valve sequence is paused so that the operator can switch drums. With the internal capacity in the valve system the operator has 30 minutes to replace the drum from the moment he acknowledges the drum.

Figure 25 GEM WEC ash removal system

5.4 OPERATIONAL TESTING

The GEM operational testing schedule involved installation, startup/commissioning, 8x5 testing, and two 24x6 tests. Table 11 summarizes key achievements against operational metrics.

Table 11 Summary of Top Level Performance

Performance Metric	Target Value	Achieved Value
Total GEM Operation (hours)	592	468
Total Waste Processed (tons)	74	16.9
Avg. Waste Processed (lbs/hr)	250	72
Max Waste Processed (lbs/hr)	250	293.95
Max Average Ash Output (% of average waste processed)	10%	9.97%
Total $kWh_{(e)}$ Produced	25,974	13,689
Peak $kW_{(e)}$ Produced	64	62
Net Peak $kW_{(e)}$ Produced	36	40
Total kW_{th} Recovered	0	0
Specific Power Yield (kWh/ton)	376	810
Energy Content of Waste (BTU/lb [kWh/lb])		
Average	n/a	7,331 [2.15]
High	n/a	8,399 [2.46]
Low	n/a	5,804 [1.70]
Gross Electrical Conversion Efficiency [Net after Parasitics]		18.8% [12.2%]

The GEM was packaged and ready for delivery to Edwards AFB on 19 April 2012. The GEM container, diesel generator container, and auxiliary equipment was loaded onto two flatbed trucks and shipped to California. The GEM arrived at the landfill site within Edwards AFB on 25 April 2012.

Installation of the GEM began on 25 April 2012. During this phase of the project, the team located and placed the GEM on the concrete slab. Over the course of the following three weeks, the GEM was fully installed. Installation of the GEM included the following major tasks:

- Installation of the feeding hopper to the GEM
- Power wiring of the breaker panel to the GEM control system
- Power wiring of the generator to the switchgear
- Signal and communication wiring between the GEM, the generator container and the control room.
- Cyclone, ash removal, flare assembly installation
- Packaging materials removal
- Fabrication of the gas line from the gasifier system to the generator container
- Painting the roof of the container white
- Installation of the fire suppression piping and alarm panel.
- Reassembly of auxiliary systems (i.e. Lights, horns, strobes, baghouse ash storage containers)

On 11 May 2012 the GEM was fully installed and ready for startup. Unfortunately, the AFB did not have its base license approved so the GEM was not operated until the license was approved. However, an initial startup checklist was performed to ensure proper installation. The checklist can be found in Appendix B.

On 18 June 2012, the base license was approved and the GEM was ready for startup and commissioning. The first GEM operation occurred on 20 June 2012. It was during the commissioning phase where a fault in the generator was discovered. The generator used at Edwards AFB originally was not the same unit that was tested at Waltham, MA. Due to the pending SCE application, the original manufacturer's generator was installed on the diesel engine to avoid the requirement to submit amended interconnection documentation. Through testing and analysis, it was determined that the generator had a short in its windings. Therefore, the generator needed to be replaced. Based on budget constraints and lack of movement by SCE in evaluating the interconnection application, MSW Power sent its backup generator to Edwards AFB. This generator wasn't replaced until 17 July 2012.

During the generator troubleshooting and replacement period, the gasifier and SWP systems were commissioned and adjusted for the change in feedstock characteristics. The production of syngas was flared to the environment during this phase. The general operation timeframe was eight (8) hours per day five (5) days a week.

Full system 8x5 operation began on 18 July 2012. This operation continued for 4.5 weeks before the first 24x6 operation. The end of the first set of 8x5 operation occurred on 10 August 2012.

The first 24x6 operation occurred from 13 to 19 August 2012. During this time, the GEM was run continuously for 144 hours.

On 20 August, the second set of 8x5 operation occurred. This operation lasted until 13 September 2012. During this phase of operation, emission testing was conducted.

The final stage of operation of the unit at Edwards AFB occurred during the second 24x6 test. The operation ran from 16 to 22 September 2012.

After the second 24x6 operation, the GEM was closed up for long term storage.

On 4 February 2013, the system was disassembled and removed from the site on 8 February 2013 and delivered to Massachusetts on 14 February.

5.5 SAMPLING PROTOCOL

The process and instrumentation diagram (PID) for the GEM WEC Demonstration system is shown in Figure 18. The data sampling points are shown in the PID for characterizing the performance of the SWP and thermal decomposition/energy generation subassemblies and in quantifying all of the performance objectives (Sections 3 and 6). Table 12 lists the analyses performed during the Demonstration, the equipment that was used to make the measurements, and the standard/protocol used for carrying out the measurement.

Most of the measurements were recorded on the PLC data loggers. The data sampling rate was set for each PLC and ranges from one to five seconds. Data was sampled and recorded for all of the working operational phases and during all of the test runs when the system was in operation. Data averages were taken over specified time intervals. Emission test data from the generator was prepared by contract third party TRC Companies, Inc. [24].

Table 12 Analyses for characterizing performance of GEM WEC system during Edwards AFB Demonstration

Analysis	Measurement Equipment	Standard/Protocol	Responsible Party	Data Collection Method
Solid Waste Preprocessing Analysis				
Solid Waste Feedstock Analysis Composition (plastic, paper, cardboard and food discards)	Scale	Laboratory procedure	IST	2
Pellet Analysis				
Sampling	Food shredder		IST	2
Ash	TGA	ASTM D3174	IST	2
Volatiles	Oven	ASTM D3175	IST	2
Fixed carbon	TGA	ASTM D3172	IST	2
Heating value	Bomb calorimeter		IST	2
Moisture content	Oven	ASTM D3302, D3173	IST	2

Analysis	Measurement Equipment	Standard/Protocol	Responsible Party	Data Collection Method
Elemental (C, H, O, N, S)	NA	Contract laboratory	Third Party	4
Dimensions	Digital caliper	Laboratory procedure	IST	2
Density	**{TBD}**	ASTM D6683	IST	2
Fines	Shaker, wire mesh screens	ASTM D6913, D422	IST	2
Mechanical integrity	Instron	Laboratory procedure	IST	2
Shredder				
Shredder level sensor	Paddle switch	PLC data logging	Automated	1
Drier				
Relative humidity inlet/outlet	Relative humidity meter	PLC data logging	Automated	1
Hot air inlet temperature	Thermocouple	PLC data logging	Automated	1
Hot air inlet velocity	Pitot tube	PLC data logging	Automated	1
Exhaust gas temperature	Thermocouple	PLC data logging	Automated	1
Exhaust filter pressure drop	Pressure transducer	PLC data logging	Automated	1
Pelletizer				
Pelletizer level sensor	Paddle switch	PLC data logging	Automated	1
Gasifier Analysis				
Pellet Flow Rate	Balance	PLC data logging	Automated	1
Bottom Ash				
Mass flow rate (lbs/hr)	Balance	PLC data logging	Automated	1
Elemental composition	NA	Contract laboratory	Third Party	4
TLCP testing	NA	Contract laboratory	Third Party	4
Temperature	Thermocouple	PLC data logging	Automated	1
Reactor Analysis				
Primary air velocity	Wedge meter	PLC data logging	Automated	1
Secondary air flow rate	Vortex flow meter	PLC data logging	Automated	1
Ambient air humidity	Relative humidity meter	Calibrated sensor	Automated	1

Analysis	Measurement Equipment	Standard/Protocol	Responsible Party	Data Collection Method
Gasifier temperatures	Thermocouples	PLC data logging	Automated	1
Gasifier differential pressure	Pressure transducer	PLC data logging	Automated	1
Grate differential pressure	Pressure transducer	PLC data logging	Automated	1
Grate drive rotation sensor	Proximity sensor	PLC data logging	Automated	1
Gasifier level sensor	Paddle switch	PLC data logging	Automated	1
Power Generation				
Heat Exchanger Performance				
Producer gas inlet/outlet temperatures	Thermocouples	PLC data logging	Automated	1
Producer gas flow velocity	Pitot tube	PLC data logging	Automated	1
Producer gas inlet composition (CO, CO_2, O_2, NO_x)	Gas Chromatography	Contract Laboratory (ASTM D1945-96)	Third Party	4
Air inlet/out temperatures	Thermocouple	PLC data logging	Automated	1
Air flow velocity	Pitot tube	PLC data logging	Automated	1
Producer Gas Analysis				
Tar analysis	Sample train		IST	2
Producer gas outlet composition (CO, CO_2, O_2, NO_x)	Gas Chromatography	Contract Laboratory (ASTM D1945-96)	Third Party	4
Producer gas heating value	N/A	Contract Laboratory (ASTM D3588-98)	Third Party	4
Producer gas velocity	Wedge meter	PLC data logging	Automated	1
Filter Analysis				
Fly ash elemental analysis	NA	Contract laboratory	Third Party	4
Fly ash TCLP Analysis	NA	Contract laboratory	Third Party	4
Fly ash temperature	NA	PLC data logging	Automated	1
Fly ash flow rate	Thermocouple	Periodic manual sampling	IST	2

Analysis	Measurement Equipment	Standard/Protocol	Responsible Party	Data Collection Method
	Balance			
Engine/Electric Generator				
Power quality	Load Bank	PLC data logging	Automated	1
Generator output	Load Bank	PLC data logging	Automated	1
Parasitic energy loss	Load Bank	PLC data logging	Automated	1
Moisture	Impingers, Gravimetric analysis	EPA Method 4	Third Party	
O_2/CO_2	NDIR/ Paramegnetic detection	EPA Method 3A	Third Party	4
SO_2	UV Detection	EPA Method 6C	Third Party	4
NO/NO_X	Chemiluminescent Analyzer	EPA Method 7E	Third Party	4
CO	NDIR	EPA Method 10	Third Party	4
VOC	TCA (NDIR)	SCAQMD Method 25.3	Third Party	4
Particulate weight	Isokinetic sampler, Gravimetric analysis	ARB Method 5	Third Party	4
Engine emission velocity	Isokinetic Sampler, Pitot tube	EPA Method 1A & 2	Third Party	4
Waste Heat				
Flow velocity	Pitot tube	PLC data logging	Automated	1
Waste heat air temperature	Thermocouple	PLC data logging	Automated	1

Note: 1: Operational data recorded to the data log every 5 seconds. Every day the data was sent to IST Database server.
2: Results were hand recorded in lab a notebook designated for ESTCP testing and digitally entered into excel.
3: The data was recorded every 2 seconds on the instruments operating computer. The data was stored on the local hard drive. IST transferred a copy of the data file to its database server.
4: The results were presented to IST in a report by the third party. The hard copy of the report was placed within the ESTCP lab notebook as well as digitally copied and stored on IST's server in a file designated for ESTCP data results.

Samples collected during the working operational phases for physical and chemical characterization were the solid waste entering the shredder, the pellets entering the gasifier and

the following GEM WEC effluents: bottom ash, particulate matter and fly ash. Tars were not collected, but were analyzed in line. Table 13 shows the operational phase, sample, number of samples, collection frequency and test duration. Every day, samples were collected during the first hour of the run, middle of the run and within the last hour of the run, blended together, and prepared for analysis. The mass and energy balance is strongly dependent on the energy content of the pellets. As a result, the pellets were analyzed for their energy content every day (Appendix C).

5.6 SAMPLING RESULTS

Sampling activities performed under this project were focused on three core aspects of the demonstration:

1. Electrical output
2. Air emissions
3. Solid waste emissions

Table 13 Samples collected during GEM WEC demonstration

Operational Phase	Sample	No of Samples Collected	Collection Frequency	Collection Duration (days)
Initial Start Up	Solid waste feed	6	1/day	1
	Pellets*	6	1/day	
	Tar analysis**	NA	1/day	
Commissioning	Solid waste feed	6	2/5 days	10
	Pellets*	6	2/5 days	
	Pellets (energy content)***	2	1/day	
	Bottom ash	3	2/5 days	
	Fly ash	3	1/5 days	
	Tar analysis*	NA	2/5 days	
	Particulates	1	1/5 days	
Five Day Weekly (5 x 8)	Solid waste feed	2	1/5 days	40
	Pellets****	2	1/5 days	
	Pellets (energy content)***	2	1/day	
	Bottom ash	2	1/5 days	
	Fly ash	2	1/5 days	
	Tar analysis**	NA	1/3 days	
	Particulates	1	1/5 days	
Six Day Weekly (6 x 24)	Solid waste feed	2	1/5 days	12
	Pellets****	2	1/5 days	
	Pellets (energy content)***	2	1/day	
	Bottom ash	2	1/5 days	
	Fly ash	2	1/5 days	
	Tar**	NA	1/3 days	
	Particulates	1	1/5 days	

* Full analysis
** Tars will not be collected, but will be analyzed in line. A frequency of 2/5 days indicates that tars will be analyzed twice over a five day period.
*** Pellets will only be analyzed for their heating value.
**** Pellets will be analyzed for ash, volatiles, fixed carbon and moisture content.

5.6.1 Electrical Output

IST Energy performed sampling of electrical output data for the demonstration activity. The frequency, voltage, and power output of the GEM WEC System were monitored. Data pertaining to frequency and power output were collected via on-board PLCs, while voltage was collected using a portable power meter and hand tabulation of data. Data was collected approximately every five seconds and outputted in a format acceptable for use in Microsoft Excel. Data analysis was performed within Excel. As noted previously, site limitations associated with local utility provider non-responsiveness hampered the ability to feed power to the facility. Thus, electrical output data, while demonstrative of the ability of the GEM WEC System to generate power, could not be compared to grid power characteristics. Plots for key electrical parameters over a sampling period of approximately six hours are provided in Figures 26-29 provide charts showing power quality (i.e. consistency) over this period.

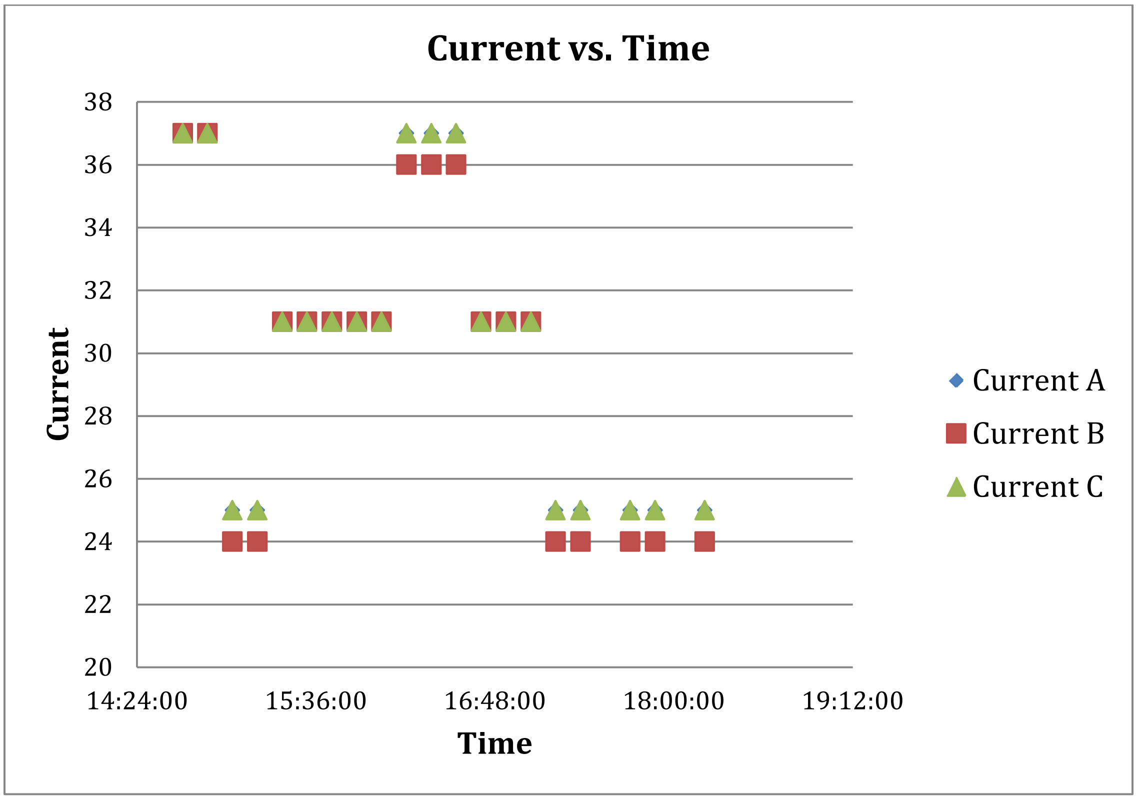


Figure 26 Current versus time for six-hour sampling period

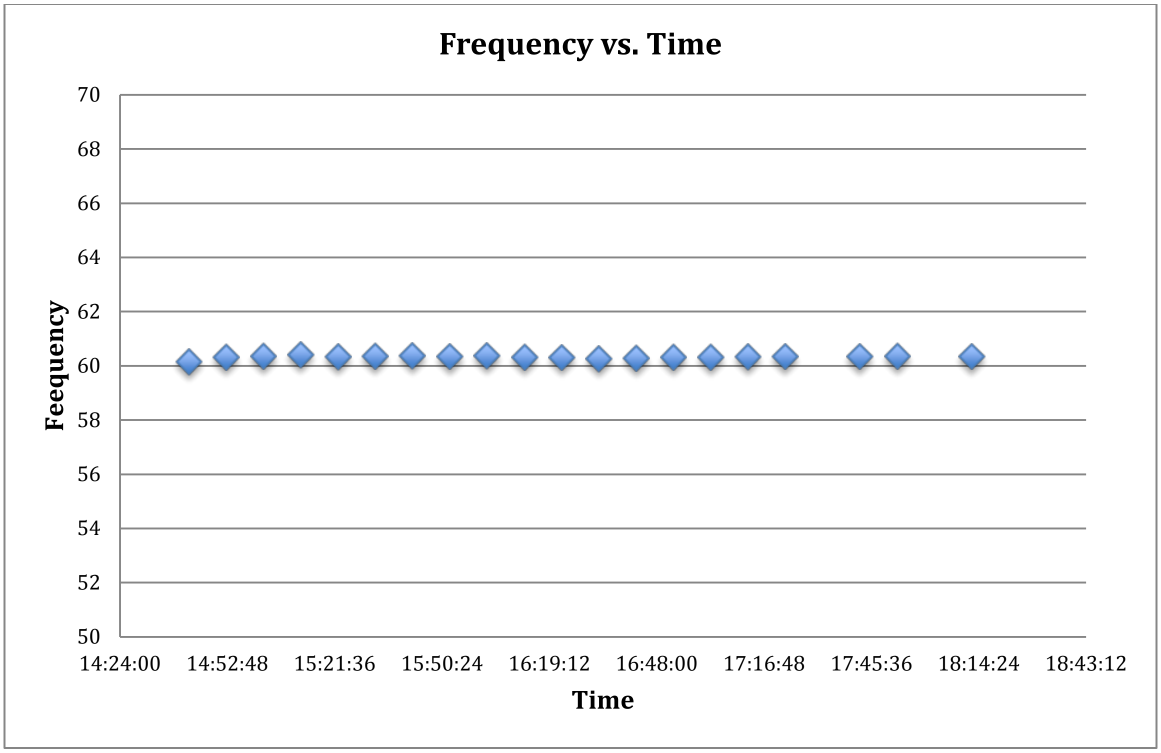


Figure 27 Frequency vs. time for six-hour sampling period

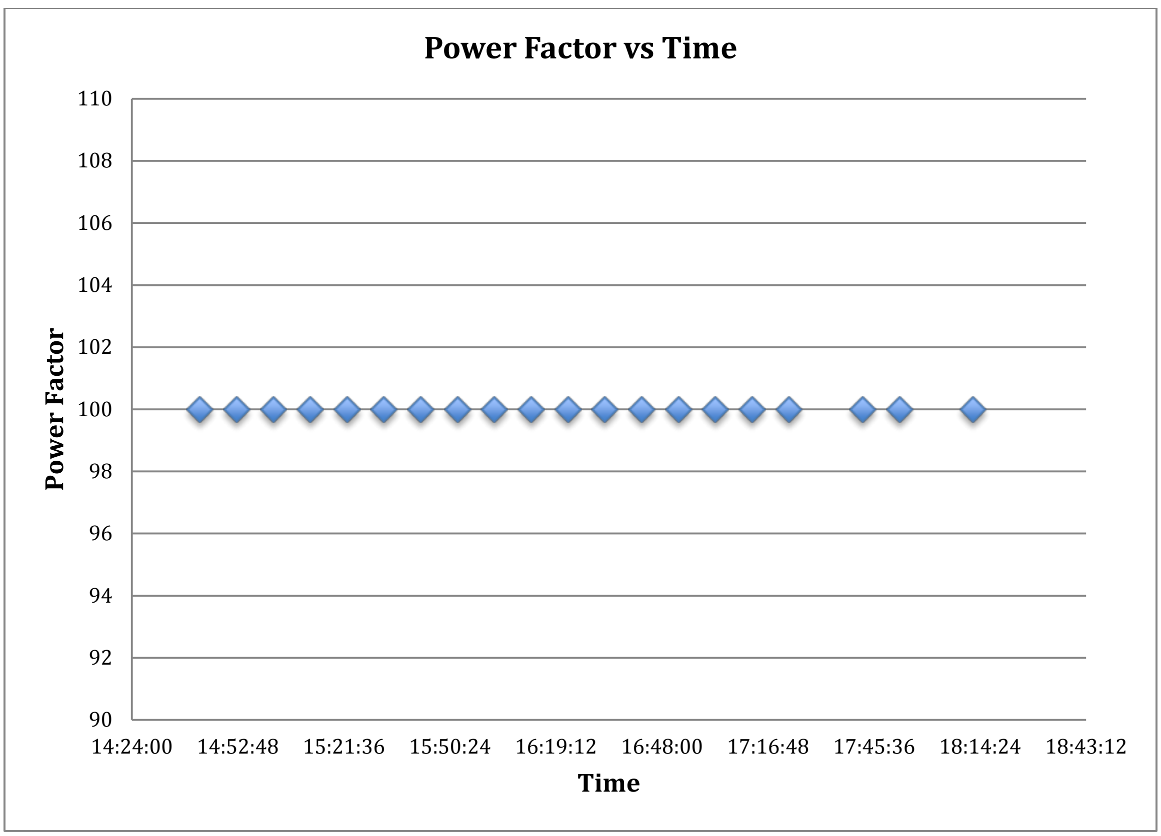


Figure 28 Power factor vs. time for six-hour sampling period

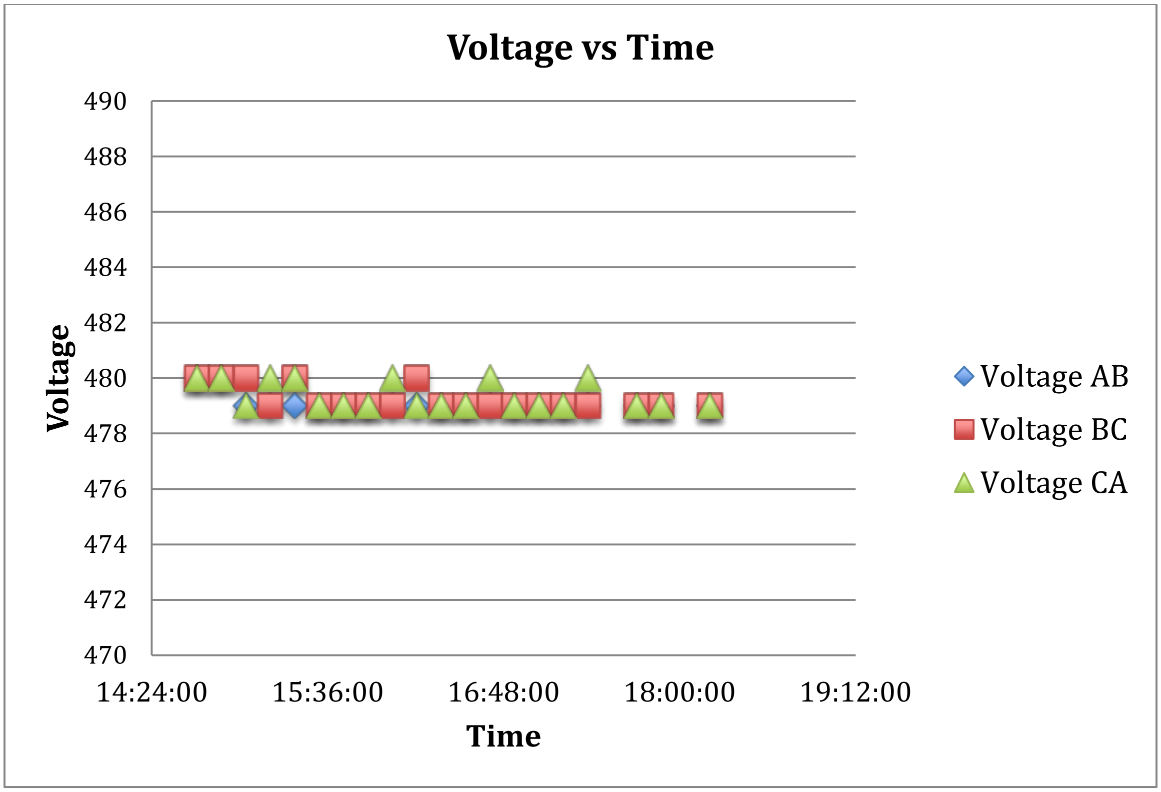


Figure 29 Voltage vs. time for six-hour sampling period

5.6.2 Air Emissions

TRC Companies, Inc. was contracted to perform third party compliance testing of the GEM WEC System's modified diesel generator set (John Deere Model 6068HF285). Sampling was performed on 12 September 2012. Testing consisted of three 60-minute test runs for compliance determination on the engine stack while the unit operated at normal production limits. EPA Method 3A (O2/CO2), EPA Method 6A (SO2), EPA Method 7E (NOx), and EPA Method 10 (CO) were performed. Triplicate 60-minute test runs were also performed for particulate (PM) determination using EPA Method 1A (Sample and Velocity Traverses for Small Stacks or Ducts) and ARB Method 5 (Particulate). Hydrocarbon testing consisted of triplicate 60-minute canister sampling using SCAQMD Method 25.3 (VOC). Fuel sulfur content was determined utilizing EPA Method 19 (GC-FPD). In addition to compliance testing, samples of diesel fuel (used for co-firing) and producer gas were collected and analyzed for carbon, hydrogen, oxygen, nitrogen, sulfur, heat content, and heating value in accordance with ASTM D240, ASTM D5373, ASTM D1945, and ASTM D3588. Sulfur emissions were determined from the diesel fuel sulfur and producer gas sulfur content in accordance with ASTM D3120 and ASTM D3246.

The test program is summarized in Table 14.

Table 14 Air emissions compliance test matrix

Test Condition	No. of Runs	Sample Type (Pollutant)	Sampling Method	Test Time
Normal	3	Flow	EPA Method 1A & 2	60 minutes
	3	Moisture	EPA Method 4	60 minutes
	3	PM	ARB Method 5	60 minutes
	3	O_2/CO_2	EPA Method 3A	60 minutes
	3	SO_2	EPA Method 6C	60 minutes
	3	NO/NO_X	EPA Method 7E	60 minutes
	3	CO	EPA Method 10	60 minutes
	3	VOC	SCAQMD Method 25.3	60 minutes

A full report from TRC, as submitted to EKAPCD, is provided in Appendix F. This report includes all results, provides detailed accounts of test methods, summarizes calculations, and provides copies of log sheets from the sampling activities. As shown in Table 15, the emissions were compliant for particulate matter and carbon monoxide emissions, but failed to meet regulations for NMHC+NOx. Analysis of these results is provided in Section 6.1.6.

Table 15 Summary of emissions compliance tests

	NMHC + NO_X (g/bhp-hr)	PM (g/bhp-hr)	CO (g/bhp-hr)	Gallons per Hour
Tier 3 Standard	***3.00***	***0.15***	***2.60***	
Test 1	3.21	0.08	0.01	1.23
Test 2	4.92	0.09	0.47	0.61
Test 3	4.83	0.09	1.05	0.31
Average	4.32	0.08	0.51	

5.6.3 Solid Waste Emissions

Personnel from Edwards Air Force Base were responsible for performing analysis of ash samples collected by the GEM operator. Sampling occurred over the period of July 2012 to September 2012 at took place at the demonstration site at the Main Base Active Landfill (MBAL). An example sample log is provided in Appendix D. Sample population included:

- 11 July 2012: Weekly composite sampling for each of the prior three weeks of operation
- 19 July 2012: Weekly composite sampling for the fourth week of operation
- 25 July 2012: Weekly composite sampling for the fifth week of operation

- 02 August 2012: Weekly composite sampling for the sixth week of operation
- 09 August 2012: Weekly composite sampling for the seventh week of operation
- 22 August 2012: Weekly composite sampling for the eighth week of operation
- 29 August 2012: Daily composite sampling (6 days) for the ninth week of operation
- 17 September 2012: Daily composite sample (5 days) for the tenth week of operation

Samples were analyzed for the following contaminants:

- Cam 17 metals by EPA Method 6020
- Dioxins and furans by EPA Method 8290
- CCR Title 22 Hazardous Waste Bioassay

Test results are summarized in Table 16. A report by the third party vendor (TestAmerica Laboratories, Inc.) contracted by Edwards Air Force Base to perform the ash sample analysis is provided in Appendix E. Metal contamination at unacceptable levels with found in all samples with the exception of the sample for the second day of the ninth week (29 August 2012 sample set). All samples passed the dioxin and furan test. With the exception of the sample for the first day of the tenth week (17 September 2012 sample set) all samples passed the Hazardous Waste Bioassay screen.

The primary conclusion to be drawn from this data is that the Edwards Air Force Base waste stream had a high representation of metals within its constituency. Hazardous levels in the ash can be mitigated through inclusion of active metal separation in the preprocessing area of the GEM (as is provided in the current generation of the technology).

Weekly sample conclusions are as follows:

- Week 1 Composite. Based on copper and zinc TTLC levels, deemed hazardous.
- Week 2 Composite. Based on copper and zinc TTLC levels, deemed hazardous.
- Week 3 Composite. Based on zinc TTLC levels, deemed hazardous.
- Week 4 Composite. Based on lead TCLP/STLC levels, deemed potentially hazardous.
- Week 5 Composite. Based on copper and zinc TTLC levels, deemed hazardous.
- Week 6 Composite. Based on chromium, copper, and lead STLC levels, deemed potentially hazardous.
- Week 7 Composite. Based on cadmium, copper, and lead STLC levels, deemed potentially hazardous.
- Week 8 Composite. Based on zinc TTLC levels, deemed hazardous.
- Week 9
    - Day 1 Composite. Based on lead TCLP/STLC levels, deemed potentially hazardous.
    - Day 2 Composite. Waste is not hazardous.
    - Day 3 Composite. Based on chromium TCLP/STLC levels, deemed potentially hazardous.

    - Day 4 Composite. Based on zinc TTLC levels, deemed hazardous.
    - Day 5 Composite. Based on zinc TTLC levels, deemed hazardous.
    - Day 6 Composite. Based on cadmium and copper TTLC levels, deemed hazardous.
- Week 10
    - Day 1 Composite. Based on failure of Hazardous Waste Bioassay analysis, deemed hazardous.
    - Day 2 Composite. Based on zinc TTLC levels, deemed hazardous.
    - Day 3 Composite. Based on copper and zinc TTLC levels, deemed hazardous.
    - Day 4 Composite. Based on chromium and nickel STLC levels, deemed potentially hazardous.

Day 5 Composite. Based on cadmium, copper, and lead TCLP/STLC levels, deemed potentially hazardous.

Table 16 Ash sample analysis

Parameter	TCLP (mg/L)	STLC (mg/L)	TTLC (mg/kg)	Week 1 Composite (mg/kg)	Week 2 Composite (mg/kg)	Week 3 Composite (mg/kg)	Week 4 Composite (mg/kg)	Week 5 Composite (mg/kg)	Week 6 Composite (mg/kg)	Week 7 Composite (mg/kg)	Week 8 Composite (mg/kg)
antimony		15	500	_160_	13	_250_	47	18	40	31	32
arsenic	5.0	5.0	500	1.2	0.81	1.3	1.0	1.3	0.66	0.98	1.1
barium	100	100	10000	280	190	250	170	_980_	340	380	470
beryllium		0.75	75	0.15	0.20	0.12	0.079	0.16	0.17	0.14	0.27
cadmium	1.0	1.0	100	_15_	0.42	***24***	8.7	4.0	4.2	_12_	***31***
chromium	5	5(560)	2500	***240***	_77_	***110***	_60_	28	_67_	38	_46_
cobalt		80	8000	9.6	6.3	4.7	2.2	2.6	2.2	4.6	4.0
copper		25	2500	_7800 *_	_9400 *_	_590_	_2000_	_2800 *_	_1800_	_790_	_310_
lead	5.0	5.0	1000	***110***	_53_	***170***	***160***	***100***	_78_	_75_	***210***
mercury	0.2	0.2	20	ND	ND	ND	ND	ND	ND	ND	ND
molybdenum		350	3500	13	7.4	9.0	7.0	2.8	4.3	5.5	7.6
nickel		20	2000	_300_	160	_200_	86	140	130	68	72
selenium	1.0	1.0	100	ND	ND	ND	ND	0.65	0.34	0.37	ND
silver	5.0	5.0	500	30	4.7	11	8.9	1.7	1.6	5.9	10
thallium		7.0	700	ND	ND	ND	ND	0.13	ND	0.13	ND
vanadium		24	2400	3.6	11	1.4	3.8	6.8	6.4	5.4	4.5
zinc		250	2500	_3200 *_	_3500 *_	_3000 *_	1200	_21000 *_	1300	1800	_2800 *_
Dioxin (2,3,7,8-TCDD)		0.001	0.01	0.000064	0.00003	0.000015	0.000088	0.00000026	0.00013	0.000046	ND
Haz Waste Bio Assay[(a)(b)]	N/A	N/A	PASS LC50>750mg/L	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

Notes:

Complete analytical results are presented in Appendix A

Value exceeding TCLP or STLC

Value approaching the TCLP or STLC limits.

Failed Haz Waste Bio Assay.

Values exceeding 20 x TCLPs are in **bold**

Values exceeding 10 x STLCs are in *italics*

Values exceeding TTLCs are indicated by asterick*

[(a)] This is a pass/fail test, at 750 mg/L. The final fish survival rate is used to determine whether or not the sample passes state criteria for non-hazardous waste, namely an LC50 greater than 500 mg/l (in other words, the concentration necessary to kill half of the exposed fish must be greater than 500 mg/1).

[(b)] CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

U.S. EPA United States Environmental Protection Agency

mg/L milligram per liter

mg/kg milligram per kilogram

Common Laboratory Data Qualifiers and their descriptions can be seen on the individual labaoratory reports

6 PERFORMANCE ASSESSMENT

6.1 QUANTITATIVE PERFORMANCE OBJECTIVES

6.1.1 Reduce Amount of Solid Waste Requiring Disposal

To assess this objective, a representative sampling timeframe is considered. The period of 13 to 19 August 2012 is used. During this time the gasification reactor ran for a total of 122.95 hours, processing 7939 pounds of pellets. This equates to an average throughput of 64.57 lb/hr. As a result 794 pounds of total ash (bottom ash plus fly ash) were produced. This equates to an average ash generation rate of 6.46 lb/hr. Figure 30 provides a sampling of moisture data for 14 August 2012 captured at the input and output of the dryer portion of the solid waste preprocessing subsystem. Averaging this data, input and output moisture were 10.28% and 7.63%, respectively. Based on this data, solid waste was reduced to 8.97% of its original mass after processing in the GEM WEC System. Therefore, this performance objective was met.

Solid waste feed to GEM	8849 lbs
Moisture content of feed to GEM	10.28 % (or 909.7 lbs)
Mass of ash exiting GEM	794 lbs
Percent mass reduction by GEM	**91.03%**

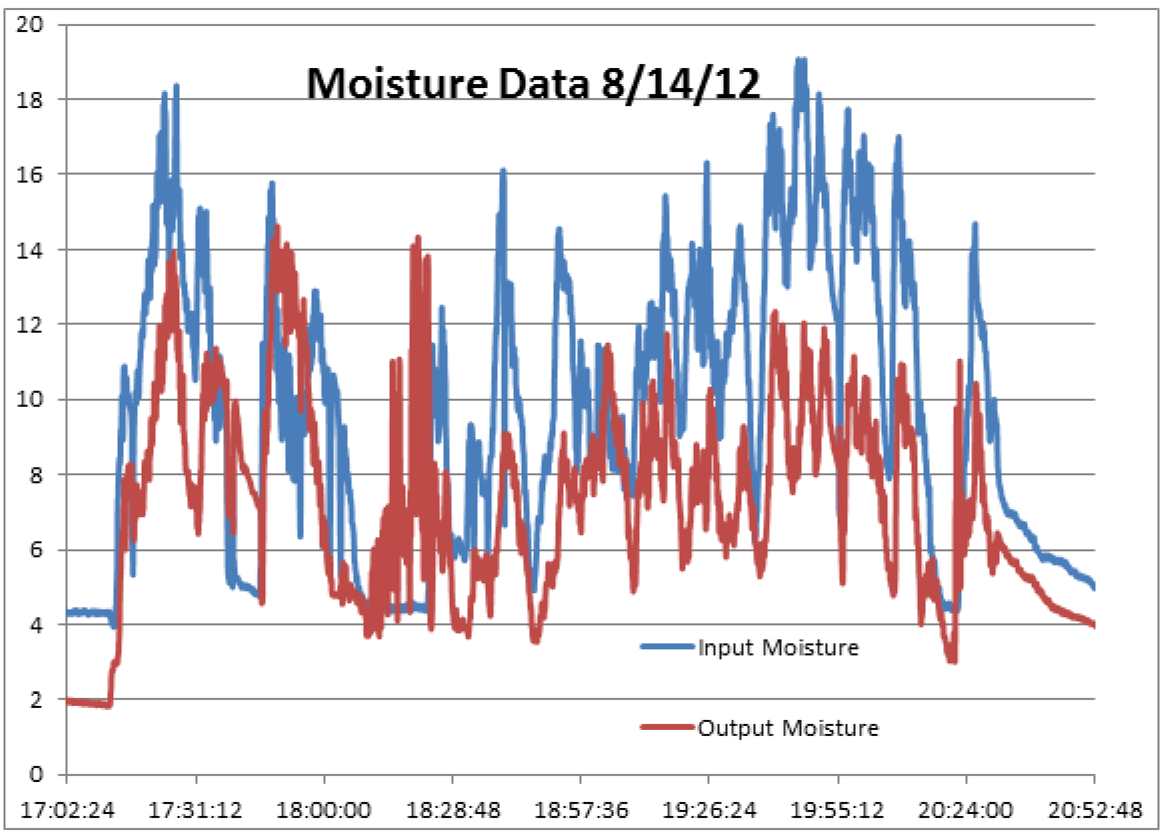


Figure 30 Input and output moisture data captured at the dryer unit within the GEM

6.1.2 Generate Electricity for On-Site Use

Data capture from the first day of the 7-day period noted in 6.1.1 will be used as a basis for evaluation of this objective. This day included start-up and is therefore anticipated to represent the lower end of system output for typical operations. Specifically, data collected on 13 August 2012 is contemplated here. On this date, the generator operated for 4 hours and 45 minutes, and was under a load of 44 kW from the load bank. Due to limitations at the site, data corresponding to parasitic load from the GEM was not captured. However, historical data indicates an average parasitic load of 8.67 kW for the entire process system per ton of solid waste processed. A total of 832 pounds of waste was processed by the preprocessor; therefore, a parasitic loss of 3.61 kW is assigned for this period. Net production is therefore 40.39 kW. This exceeds the threshold target of 36 kW for this performance objective.

In addition to the numerical target of 36 kW, this performance objective was also concerned with net electricity output as percentage of chemical energy in the waste feed. On 13 August the GEM operated for 11.37 hours. Pellet analysis data (Appendix C) revealed fluctuation in the waste energy content. An average gross heating value of 8905 BTU/lb is used for the analysis based on data collected. Of the 832 lbs of waste that was fed to the preprocessor, 666 lbs in the form of pellets was processed by the gasifier during the 11.37 hour period. The average flowrate was 58.6 lbs/hr; therefore, the input energy was 522022.8 BTU/hr (152.95 kW). The net energy generated was 23.5% of the input energy, easily exceeding the threshold of 7%.

6.1.3 Power Quality

IST Energy tracked frequency, power output, and voltage over the course of the GEM WEC demonstration. Although the switch gear was never connected to the grid, the power quality was found to be satisfactory for commercial use.

6.1.4 Generate Net Waste Heat for On-Site Use

The energy contained in the total waste heat could not be calculated. The pitot tubes installed in the waste heat line malfunctioned and therefore the velocity of the gas remains unknown. One of the issues associated with the waste heat pitot tubes is believed to be associated with the differential pressure transmitters. The differential pressure transmitters may have been zeroed incorrectly. The temperature of the gas may have exceeded the permissible limits of the pitot tubes leading to their failure.

6.1.5 Reduce Carbon Footprint

The metric for this objective is the life cycle reduction in the carbon footprint as a result of the gasification of combustible solid waste compared to landfill methane generation created by the disposal of solid waste into the landfill. The data required to calculate this metric were as follows:

- (a) The weight percent for each component of the MSW is denoted by (a_i)

- (b) Life cycle GHG emission factors [in metric tons CO_2 emitted per short ton of solid waste] for each material found in (a) for landfilling and gasification will be obtained from [16]. The life cycle emission factor for each component of the MSW is denoted by $(b_i)_g$ for gasification and $(b_i)_l$ for landfilling.
- (c) Total emissions are the sum of the products of (a) and (b) for each material found in the MSW; for gasification, $(c)_g = \Sigma (a_i)*(b_i)_g$ and landfilling $(c)_l = \Sigma (a_i)*(b_i)_l$.
- (d) The metric for this performance objective is calculated as $[(c)_g - (c)_l]*100/(c)_l$; a negative value indicates a reduction in the carbon foot print of the GEM WEC system compared to landfilling.
- (e) The total yearly reduction in GHG emissions is given by $(GHG)_e = [(c)_g - (c)_l]*m_e$ where m_e is the flow rate of solid waste entering the GEM WEC system

To perform the analysis, noncombustible portions of the waste stream were not considered, as they do not contribute to GHG emissions when landfilled nor are they converted by gasification. Table 17 summarizes typical distribution of combustible waste stream constituents. Also provided in Table 17 are emission factors as provided by [16].

Table 17 Waste composition by weight

Component	Weight Percent	Emission Factor Landfilling ($(b_i)_l$)	Emission Factor Gasification ($(b_i)_g$)
Food	39.0	0.20	-0.04
Paper	25.0	0.53	-0.15
Plastic	23.5	0.01	0.30
Cardboard	12.5	0.11	-0.16

Based on Table 17, the following factor calculations are yielded:

$(c)_g$ = -0.0026
$(c)_l$ = 0.227
% change in GHG emissions as a result of GEM process = -101%

The success threshold for this aspect of the carbon footprint performance objective was a reduction of 45%; thus, the project successfully exceeded this aspect of the objective.

Using the same time period as cited in Section 6.1.1, 8849 pounds of waste was processed over a time span of 122.95 hrs. This equates to a processing rate of 71.97 lb/hr. Assuming 24x6 operation, there are 313 operating days and 7512 operating hours per year. The annual throughput for this scenario would be 540638.64 lbs/yr. Calculating the annual reduction in GHG emissions,

$$
\begin{aligned}
(GHG)_e &= [(c)_g - (c)_l]*m_e \\
&= [-0.0026 - 0.227]*540638.64 \text{ lbs/yr} \\
&= -124{,}130.6 \text{ lbs/yr} \\
&= -56 \text{ metric tons/yr}
\end{aligned}
$$

Notably, this fell short of the objective 520 metric tons per year. Contributing factors to this are:

- ***Reduced throughput.*** The system processed 28% of the design throughput due to feedstock. Operating at full capacity would increase the GHG reduction to 200 metric tons per year.
- ***Feedstock composition.*** Plastic is a negative contributor to GHG emissions from gasification. The site has higher plastic content, leading to higher impact.

6.1.6 Conform to Ambient Air Quality for State of California

As discussed in Section 5.6.2, TRC Companies, Inc. performed emission sampling on 12 September 2012. Three 60-minute equivalent test suites were conducted on the John Deere 6068H Diesel Engine model 6068HF285 while it ran in conjunction with the generator as part of the GEM WEC system. The GEM WEC did not meet the EPA Tier 3 Emission Standards for Nonroad Diesel Engines for NMHC + NO_X but did for PM and CO. Summary of results is provided in Table 16 of Section 5.6.2.

The root cause of poor results for NMHC + NOx is as follows:

- The load bank provided a fixed load of 28 kW and the engine was modified to accept syngas by installing a T-fitting at the air inlet.
- The flow of syngas fuel into the engine was fixed, causing the engine, which is naturally aspirated, to be unable to adjust its air to fuel ratio based on the richness of the syngas.

This is supported by the results for the average gallons per hour consumption of diesel fuel during each of the emission test trials. As shown, the higher the consumption, the greater the NMHC + NO_X emissions. Accordingly, the uncombusted components of the syngas and diesel fuel were realized downstream in the exhaust, thereby contributing to NMHC. Theoretically if the GEM WEC was connected to the grid as originally planned, the load on the generator would change based on the quality of the syngas.

Best Available Control Technologies (BACT) exist that can be used to reduce NMHC + NO_X including installing a non-selective catalytic reduction (NSCR) system. This technology injects a calculated amount of reducing agent such as urea or ammonia into the exhaust gas stream to convert the NO_X emissions into harmless N_2.

6.1.7 Estimate Simple Payback Period

The calculation of the simple payback period (PBP) is based on fixed costs (capital equipment cost, installation accommodation costs, and training) and annual cost savings associated with electricity and heat generated by the system along with waste disposal cost avoidance. Annual cost savings are adjusted for annual recurring costs (operation, maintenance, periodic part replacement). Table 18 provides a summary of factors and associated impacts.

Table 18 Simple payback period factors

PBP Factor	Notes/Comments	Edwards Air Force Base		
		Demo Data†	Full Capacity‡	Full Capacity‡ with Heat
Non-Recurring Up-front Costs				
GEM Purchase Price	Current commercial price from MSW Power Corporation	$1,1000,000	$1,1000,000	$1,1000,000
Installation Costs	Based on actuals for EAFB only	$47,000	$47,000	$47,000
Operator Training	Estimated cost of training	$15,000	$15,000	$15,000
Subtotal – Non-Recurring Up-front Costs		**$1,162,000**	**$1,162,000**	**$1,162,000**
Annual Savings via Cost Avoidance				
Electricity Savings	Assumed $0.08/kWh retail cost	$24,175	$45,000	$45,000
Heat Savings	Assumed $0.03/kWh natural gas	$0	$0	$40,800
Waste Disposal Savings	Assumed $75/ton	$18,400	$63,900	$63,900
Subtotal – Annual Savings via Cost Avoidance		**$42,875**	**$108,900**	**$149,700**
Annual Recurring Costs				
Consumables	Based on actuals for EAFB only, annualized	$13,000	$13,000	$13,000
Maintenance	Based on actuals for EAFB only, annualized	$13,000	$13,000	$13,000
Subtotal – Annual Recurring Costs		**$26,000**	**$26,000**	**$26,000**
Total Annual Benefit (Cost Avoidance Less Recurring Costs)				
		$16,875	**$82,900**	**$123,700**
Simple Payback Period				
Simple PBP		69 years	14 years	9.4 years

† As noted in 6.1.1, representative throughput was 72 lb/hr and ash output was 6.46 lb/hr; per 6.2.2, electricity output was 40.39 kWe.

‡ Full capacity of the GEM is 250 lb/hr; parasitic loss higher due to higher throughput (8.67 kW vs. 3.61 kW)

6.1.8 System Robustness

The robustness of the GEM WEC was determined from 18 July 2012 to 22 September 2012. On 18 July 2012, the generator became fully operational. 22 September 2012 was the final day of the 2nd 24 x 6 run. During this time, there were 16 days of unscheduled downtime of the entire GEM WEC. Table 19 provides a description of the maintenance performed.

During the first 24 x 6 run (Table 20), there were three days that did not meet the 22 hr per day requirement. On day #1, there was a premature shutdown to assess the poor syngas quality. In the evening on day #4 going into day #5, the system was shut down for routine maintenance. During the second 24 x 6 run (Table 21), only 2 days met the 22 hr per day requirement. On day #1, a communication cable melted and therefore the operator was unable to control the GEM WEC. 10.5 hrs of maintenance was performed on day #3 and 6 hrs and 6 min of maintenance was performed on day #4. On day #5, the system was offline for 17 hrs and 22 min in order to conserve pellets while the main pellet mill shaft was being repaired.

There was only one day when the GEM WEC was run for an 8/5 operation that the system had to shutdown prematurely due to a failure. On August 28th, 2012, the gasifier was prematurely shutdown at 12:45 pm because the gear box on ash auger 2 malfunctioned and needed to be replaced. The reactor was only run for approximately four (4) hours, which does not meet the seven-hour criteria.

Table 19 Maintenance performed during demonstration

Date	Comments
7/23/2012	Built fines separator, inspected bottom of HX, Secondary Air flowmeter installed, Inspected baghouses, Cleaned dryer filter and exhaust line, General SWP cleanup
8/6/2012	Engine maintenance to support 24 x 6 run
8/7/2012	Engine maintenance to support 24 x 6 run
8/8/2012	Engine maintenance to support 24 x 6 run
8/10/2012	Engine maintenance to support 24 x 6 run
8/20/2012	Replaced filter bags. Cleaned heat exchanger. Emptied bottom ash and cyclone ash. Setup MKS. Inspected and cleaned shredder, dryer exhaust and dryer bed. Cleaned SWP floor.
8/21/2012	Finished putting HX cover on, installated new engine exhaust, vacuumed reactor side of container. Replaced TCs.
8/22/2012	Performed waste characterization of Edwards waste.
8/23/2012	Picked up vice clamp for MKS repair. Removed intercooler.
8/24/2012	Cleaned intercooler with acetone, removed old turbo and installed new one. Attempted to repair MKS.
9/10/2012	Travel day
9/11/2012	Prepared system for emission testing. Modified exhaust for sampling ports. Changed filter bags. Loaded char. Exchanged bottom ash and cyclone ash bins. Performed general cleanup of GEM area. Received TRC emission team and oriented them to GEM to ensure successful testing.
9/13/2012	Emptied reactor, cleaned heat exchanger. Organized ash barrels. Greased pellet mill, emptied heavies bin, changed dryer exhaust filter, cleaned dryer bed.
9/14/2012	Cleaned secondary air, inspected cyclone piping and venturi. Changed filter bags, bottom ash, and cyclone ash. General cleanup of GEM area.

Table 20 First 24x6 run

Date	Gasifier Start Time	Gasifier Stop Time	Duration of Operation on Pellets	Comments
8/13/2012	8:29:00 AM and 5:16:00 PM	1:05:00 PM and N/A	9 hrs 39 min	Day #1 of 24 x 6 testing. Forced to shut down reactor due to poor gas quality and therefore unable to run the engine. Pellet mill conditioner jam at 12:02 pm.
8/14/2012	N/A	N/A	24 hrs	Day #2 of 24 x 6 testing. Buckets of char loaded on top of reactor in attempts of raising flame front of reactor. Pellet auger used manually to ensure complete burn through to top of reactor. Load bank continuously overtemperatured due to faulty switch on panel.
8/15/2012	N/A	N/A	24 hrs	Day #3 of 24 x 6 testing. At around 2:00 AM, the load bank started to smoke, it turned off, and then refused to turn on again. The GEM was operated independently from the generator for the rest of the day.

Date	Gasifier Start Time	Gasifier Stop Time	Duration of Operation on Pellets	Comments
8/16/2012	N/A	5:26:00 PM	17 hrs 26 min	Day #4 of 24 x 6 testing. Reactor shutdown at 8:00 pm for maintenance. Reactor drained, bottom of heat exchanger cleaned, filter bags changed, piping from HX to filter bags cleaned, as well as piping from filter bags to blower and blower to generator valve.
8/17/2012	10:49:00 AM	N/A	11 hrs 57 min	Day #5 of 24 x 6 testing
8/18/2012	N/A	N/A	24 hrs	Day #6 of 24 x 6 testing
8/19/2012	N/A	7:00:00 AM	7 hrs	Day #7 of 24 x 6 testing

Table 21 Second 24x6 run

Date	Gasifier Start Time	Gasifier Stop Time	Duration of Operation on Pellets	Comments
9/17/2012	10:33:00 AM	N/A	10 hrs 24 min	Day #1 of 24 x 6 testing. Ash auger jams @ 1230, 1323, 1341. Lost ethernet link to I/O @ 1700. Repatched 5 outputs to gasifier PLC I/O; system restored @19:00. Replaced melted Ethernet cable with temp fix I/O now working.
9/18/2012	N/A	N/A	24 hrs	Day #2 of 24 x 6 testing. Added 100 gallons of diesel to tank.
9/19/2012	N/A & 6:37:00 AM	2:37:00 AM & 5:30:00 PM	13 hrs 30 min	Day #3 of 24 x 6 testing. Communication failure with controller @ 0830 AM. Shutdown at 0237 AM & 0530 PM for Demos on 9/19 and 9/20 respectively.
9/20/2012	6:06:00 AM	N/A	17 hrs 54 min	Day #4 of 24 x 6 testing. Shaft of pellet mill fractured. New part placed on order. Machine shop contacted to aid in new installation
9/21/2012	20:22:00 PM	2:52:00 AM	6 hrs 38 min	Day #5 of 24 x 6 testing. Reactor shutdown at 02:52 AM to conserve pellets and await fully operational pellet mill
9/22/2012	N/A	11:20:00 PM	23 hrs 40 min	Day #6 of 24 x 6 testing.

6.2 QUALITATIVE PERFORMANCE OBJECTIVES

6.2.1 Ease of Use

An employee from J Torres Co Inc, the contractor responsible for the landfill at Edwards Air Force Base, was originally planned to operate the GEM WEC. Ultimately, two employees from IST Energy were involved GEM WEC operation; one to deal with solid waste inputs and another to operate the gasification unit. The employee concerned with waste inputs typically would start off the morning by sorting through trash delivered to the Baler Building. Bags of trash would be selected based on density and lack of any visible unprocessable material. Approximately 300 lbs of trash would be weighed out and placed in the two blue dump hoppers. The entire waste management process would take between 1-2 hrs. During this time, the other employee would perform a pre-operation system check which included running all of the valves and discarding the bottom ash, fly ash, and cyclone ash as necessary. It also included checking the dryer

exhaust filter and replacing as necessary, emptying the bin collecting discarded metals from the magnetic head pulley conveyor, and verifying the diesel fuel level associated with the GEM WEC generator. Lastly, the inspection would include greasing the pellet mill and initiating its warm-up sequence so that the pellet mill would reach its steady state mode by the time the solid waste preprocessing operator completed the waste management process.

At Edwards Air Force Base, there were two separate HMI screens: one for gasification operations and one for solid waste preprocessing operations. These screens could be viewed and operated simultaneously which greatly facilitated ease of use. The gasifier operator typically would sit by these HMI screens and monitor overall operations and the solid waste processor operator would be outside by the system. To startup the reactor, the operator would need to open the flare valve, secondary air valves, reactor lid and the filter valve, turn on and adjust the main reactor blower and secondary air blower, main feed auger and turn on the char igniter and flare igniter. All of these functions could be performed with relative ease on the HMI screen. The feed auger would automatically active when the level sensors read a low level in the reactor. During steady state gasification operation, the operator would need to pay attention to the scale weight on the pellet silo. As the scale weight reached the tare weight for the pellet silo, the gasifier operator would direct the solid waste processor operator to add additional pellets to the silo. The gasifier operator would also need to pay attention to the flare temperature, reactor differential pressure, and the thermocouple readouts across the reactor. If the flare temperature and reactor temperatures were to drop or if the reactor differential pressure were to decrease, the gasifier operator would need to adjust the reactor blower, secondary air valve, and grate drive settings accordingly. The differential pressure readings across the cyclone, heat exchanger, or filter bags would also need to be monitored because a blockage would indicated by an increase in differential pressure. The ability to change and clean filter bags could also be accomplished at the HMI screen.

For solid waste preprocessing operations, the system could either be started locally at the actual equipment by the operator or by the gasification operator sitting by the HMI screens. The most important aspect of the solid waste process system the gasification operator had to monitor was the pellet die temperature which could overheat causing the pellet mill to shutdown prematurely. Oftentimes, nothing could avoid this situation since it was due to the particular composition of the waste going through the system. However, the gasification operator could at least adjust the force feeder which feeds material to the pellet die. The solid waste preprocessor would dump the trash into the shredder, ensure material flow through the system by checking for bridging in any of the transition hoppers, and collect and weigh pellets that were produced by the pellet mill.

For generator operations, from the HMI screen the generator and the engine blower could be turned on and off. The switch gear and load bank were also both located inside the control room by the HMI screen and could be activated locally. To send syngas to the generator, the gasification operator had to open the generator valve and adjust the flare valve/reactor blower speed depending on the energy quality of the syngas. The gasification operator could monitor the power output of the generator from the HMI screen and could adjust the power output desired at the load bank.

6.2.2 Automatic Control System

The GEM WEC system was controllable from Waltham, MA when a virtual private network connection was established with the server in Waltham. Then, a program called Remote Desktop Connection was used to allow the controlling computer in Waltham to have access to all the programs and files on the GEM WEC computer at Edwards Air Force Base. The primary HMI software used was FactoryTalk View Site Edition

In FactoryTalk View, screens were developed to operate both the gasification and solid waste preprocessing operations. These screens contain inputs to control set points as well as readouts for the various sensors across the GEM WEC. Some processes such as filter bag cleaning, dryer weir control, pellet mill startup, and feed auger operation are automatic and require minimal user involvement. Other aspects of the GEM WEC such as controlling the amount of secondary air that enters each zone of the reactor is more difficult to automate and requires maximum user involvement. Warnings and alarms were programmed to indicate when the pellet feed auger and ash augers malfunction or when an emergency stop switch, VFD, or fuse was tripped. Light indicators were also programmed so that the operator could easily discriminate between equipment that was energized/de-energized.

6.2.3 Identify Single Point System Failures

A key aspect of ensuring system reliability is the identification of single point failure risks and appropriately mitigating them. As a result of the demonstration, four single point failure risks were identified:

- ***Pellet mill.*** The waste composition at Edwards AFB was determined to be higher in metal than anticipated. Bulk metal inclusions were found to reduce the reliability of the pellet mill by initiating jamming. On 24 July 2012 a jamming event led to the main pellet mill shaft severing, thereby rendering the equipment inoperable for two days. The replacement part cost $1,000. To avoid this type of issue in the future, new models of the GEM have been designed to include enhanced metal separation, which would divert bulk metal inclusions prior to reaching the pellet mill.
- ***Engine.*** Due to decreasing engine performance, the genset engine was inspected on 24 August 2012. The inspection revealed blade damage within the turbo, apparently due to foreign material intrusion (Figure 31). A new turbo charger was ordered and installed the following day with a replacement part cost of $500. The source of the foreign material was not determined; however, as no special precautions were made to protect the engine against sand, this very well may have been the cause. It is therefore recommended that future deployments of the system to desert settings consider countermeasures to reduce sand intrusion.
- ***Cyclone.*** During the decommissioning of the GEM (4-8 February 2013) a break in one of the welds on the cyclone inlet piping was discovered (Figure 32). The piping was covered with insulation throughout the demonstration period, and therefore was not

discovered. It is suspected that this may have contributed to the reduced output of the system during the demonstration period.

- ***Ash removal.*** During operation on 28 August 2012, the second stage ash auger gearbox malfunctioned. The part was replaced the next day at a cost of $700. Cause of the malfunction is believed to be passage of abnormally large clinkers through the grate system at the base of the reactor. To mitigate future occurrences, a modification of the grate system has been designed and implemented.

Figure 31 Genset engine turbo blade with apparent damage from foreign materil intrusion

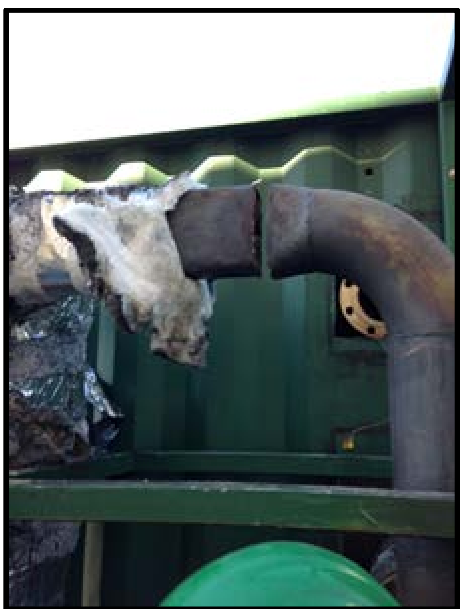


Figure 32 Break in cyclone piping

7 COST ASSESSMENT

7.1 COST MODEL

The cost model looks at several cost elements that are associated to the GEM product. Table 22 summarizes the costs per item.

Table 22 Cost elements associated with GEM WEC System

Cost Element	Data Tracked during the Demonstration	Estimated Cost
Hardware Capital Costs	Based on base model commercial offering from MSW Power	$1,100,00.00
Installation Costs	Labor and material required to install	$47,000
Consumables	Estimates based on rate of consumables use during the field demonstration	$13,000
Facility Operational Costs	Reduction in energy required vs. baseline data	$0.08/kWh electricity $75/ton of waste disposal $0.03/kWh heat
Maintenance	Frequency of required maintenance and labor and material per maintenance action	$13,000
Hardware lifetime	Estimated based on components degradation during demonstration	15 years
Operator Training	Estimate of training costs	$15,000

A detailed view of the cost elements above are highlighted below:

- Hardware Capital Costs
    - MSW Powers GEM product costs $1,100,000. That is the entirety of the hardware capital costs for the project
- Installation costs
    - It took 160 man-hours a week over three weeks to complete the installation of the GEM at Edwards AFB. With an average rate of $37.15, the labor costs were $17,832.
    - A contractor was also used to provide some assistance in the large power wiring required. The contractor was responsible for power wiring from the main power panel to the GEM control cabinet, power wiring from the generator to the switchgear and signal wiring from the switchgear to the generator. Total cost was $10,000.
    - Edwards AFB was responsible for the costs associated with a concrete pad, fencing and local power distribution panel. Cost incurred by Edwards AFB for these items are unknown but estimated in the $14,000 range
    - Other materials that were purchased for installation include 3" schedule 40 carbon steel pipe to integrate the Gasifier gas stream to the generator. This was a build to spec onsite item. Additional materials for fire suppression installation and signal wires from the operating station to the GEM controls were also purchased for field installation. Total costs: $5,000.
- Consumables
    - The consumables used on site are
        - Char for cold reactor start ups

            - 13 cold start ups over the duration of the project with $100/cold start up costs for the char. This equates to $1,300. An additional two cold start ups to start the 24 x 6 operations added another $200. A total cost for char was $1,500.
        - Filter bags
            - 26 changes of the filter bags were conducted during the demonstration period
                - 9 filter bags per change with each bag costing $7.50.
            - Total project cost for filter bags was $1,755
    - Additional consideration is given for replacement part, bringing the total for this factor to $13,000.
- Facility operating costs
    - Due to the high ash content (organic ash and metal contamination) caused a much lower than expected average kW output. The average consumed 8.67 kW/ton of waste. The GEM also produced 400kW/ton electrical output. Therefore a net benefit of 391.33 kW per ton was achieved. Although this is well below our baseline study of 591.33 kW/ton net electrical output, the loss is contributed to the waste composition. At this time, the disposal costs for Edwards is unknown. Also, during the time of the demonstration, they did not require any collection of waste heat. Additionally, no cost information is currently known for their heating fuel. Without these numbers a full cost analysis for operating costs can be calculated
- Maintenance
    - Over the course of the demonstration period, the product experienced several maintenance areas
        - Pellet Mill material jams
            - Due to the high metal content, the pellet mill would jam. We experienced 29 pellet mill jams. It takes on average 1 hour to clear a jam. At a labor rate of $37.15, a total of $1,077.35 was spent clearing the pellet mill
        - Pellet Mill main shaft failure
            - We experienced a major failure of the pellet mill main shaft. This failure is due to the metal contamination of the feedstock. The material cost for a new shaft was $1,000. It took 15 manhours to replace the shaft at $37.15/hr. A total replacement cost of $1,557.25
        - Filter bag replacement
            - On average a filter bag module was replaced in 25 minutes. A total labor cost for the 26 changes was $402.46.
        - We had the turbocharger on the engine stick and freeze during the duration of the demonstration project. It required 2 mahours to clean and re-install. No material costs were required, and the labor costs were $148.60.
- Lifecycle estimation
    - The demonstration period did not cause any significant deterioration of the reactor system. It is still expected to have a lifecycle of 15 years assuming proper preventative maintenance is conducted.

- Operating training
    - During the demonstration period, MSW Power Corporation (formally known as IST Energy) was operating the GEM system. No formal training to any third party was conducted. MSW Power estimates a training cycle to cost ~$14,000.

7.2 COST DRIVERS

The major cost drivers for the GEM product is the initial capital investment. With a purchase price of $1,100,000 it is by far the highest cost. In terms of return on investment cost drives, that depends on the cost of electricity, waste disposal, heating costs and needs/duty cycle and waste composition. It is recommended that the GEM be installed with a metal separation process (as is currently available in its commercial unit). This will reduce any metal contamination down to less than 1%. Consequently this will help increase net power output closer to 600 kW/ton as well as provide an innocuous ash stream. Edwards AFB did perform preliminary metal testing for leachates to categorize the waste as hazardous or non-hazardous, they did not perform an actual leachate tests. Since the metal going through this process was cooper, nickel, steel, steel with chrome plating, brass, and stainless steel primarily, IST and MSW Power suggest that this material wouldn't trip any leachate requirements for disposal.

7.3 COST ANALYSIS AND COMPARISON

The cost analysis for the Edwards AFB GEM system is based upon:

- ***Waste throughput.*** This term is defined as the amount of waste the system processes per unit time. The GEM is designed to process 250 lb/hr mixed waste. Accordingly equipment sizing and corresponding capital outlays are in accordance with this typical throughput. For use scenarios that will be less than design throughput (i.e. due to operational use requirements and/or waste characteristics), the payback period (PBP) and return on investment (ROI) will be less than favorable for that given user and operational scenario.
- ***Waste composition.*** This term is defined as the chemical make-up of the waste stream. The GEM is designed to extract chemical energy from waste via thermal processes. Thus, noncombustible portions of the waste stream are essentially "dead weight" in the feedstock. Further, moisture content detracts from overall energy output, as it not only serves as "dead weight" but also consumes some of the process heat. Therefore, waste streams having high noncombustible (metal/glass/ceramic) and/or high moisture contents will result in a less favorable energy balance and, ultimately, less favorable process economics.
- ***Net electrical production.*** This term is defined as the amount of electricity being exported by the GEM less the amount of externally-sourced (i.e. drawn from the grid) electricity consumed by the GEM to operate. Clearly, the higher the net production the more favorable the economics.
- ***Electrical costs.*** This term is use site-specific and is defined as the actual cost per kW realized by the user for consumption of typical electricity supply (i.e. for a fixed site that is not report, this would be the cost charged by the utility provider). Factors such as geography and source of electricity impact this. Domestic grid-supplied

electricity costs are typically higher on the coasts than in the interior of the country; and typically more expensive in isolated areas such as island communities.

- ***Heat production.*** This term refers to the usable heat captured from the GEM. The GEM is designed to be a combined heat and power (CHP) solution and relies upon cost savings associated with heating to realize its full economic potential.
- ***Heating fuel costs.*** As with electrical costs, heating fuel costs are use site-specific. They are dependent upon the nature of heat generation (i.e. natural gas vs. oil) and also vary with geography.
- ***Waste disposal flow rate.*** This term is defined as the rate at which a site disposes its waste (i.e. two tons per day). Choosing to install the GEM at a site with insufficient waste generation/disposal rates (i.e. resulting in less than 3 tons per day of waste that can be processed by the GEM) will increase the PBP.
- ***Waste disposal costs.*** This term is defined as the cost (i.e. $ per ton) for typical waste disposal means. Higher costs here lead to a shorter PBP for the system.
- ***Other Operating costs.*** These are known or predicted costs that can be annualized over the service life of the system.
  - ***Maintenance materials.*** This term is defined as replacement parts and other items that are known to be required but whose replacement is not tied to a defined schedule.
  - ***Consumables.*** This term is defined as reoccurring material purchases required for effective operation of the system.
  - ***Manpower.*** This term is defined as dedicated manpower required to operate the system.

On average, under separate studies, the GEM has been demonstrated to produce >66kWe net electrical production, 182 kWth heat production while consuming 3 tons of trash and converting it into 300 lbs of ash per day. Other direct costs include maintenance, consumable and diesel consumption costs. For the purposes of this analysis, the maintenance and consumable costs is defined as 5% of system purchase price.

The GEM at Edwards AFB produced on average 50kW gross electrical output (net of 24 kWe) and 65kWth heat recovered. Ash output was approximately 10% or 600 lbs/day.

It is important to note that since this product replaces energy requirements from the grid, there is no direct comparison to existing technology that the GEM would replace onsite.

Additionally, the cost model doesn't account for decreasing and eventually closing of the landfill site. It has been estimated that closing the landfill and monitoring of its status will cost in excess of $25,000,000.

A cost assessment was provided in Section 6.1.7 as part of the simple payback period assessment.

7.3.1 Payback Sensitivity Analysis

As noted previously, typical utility and waste hauling costs have a significant impact on the payback period for the GEM WEC system. Figures 33 and 34 provide insight into the variability of the payback period as a function of electricity costs and waste disposal costs, respectively. For both scenarios, the following assumptions are made:

- Annual operation of 24 hours a day for six days a week; 7444 hours per year
- Waste throughput = 3 tons per day; 930 tons per year
- Average net outputs of 66 kW electric and 182 kW heat
- Average solid to gas conversion efficiency of 90%
- One-time costs of $1.1M for the system, $47,000 for installation, and $15,000 for training
- Annual recurring costs of $13,000 for consumables and $13,000 for maintenance
- Baseline utility costs of $0.08/kWh electric, $0.03/kWh heat, and $75/ton waste disposal

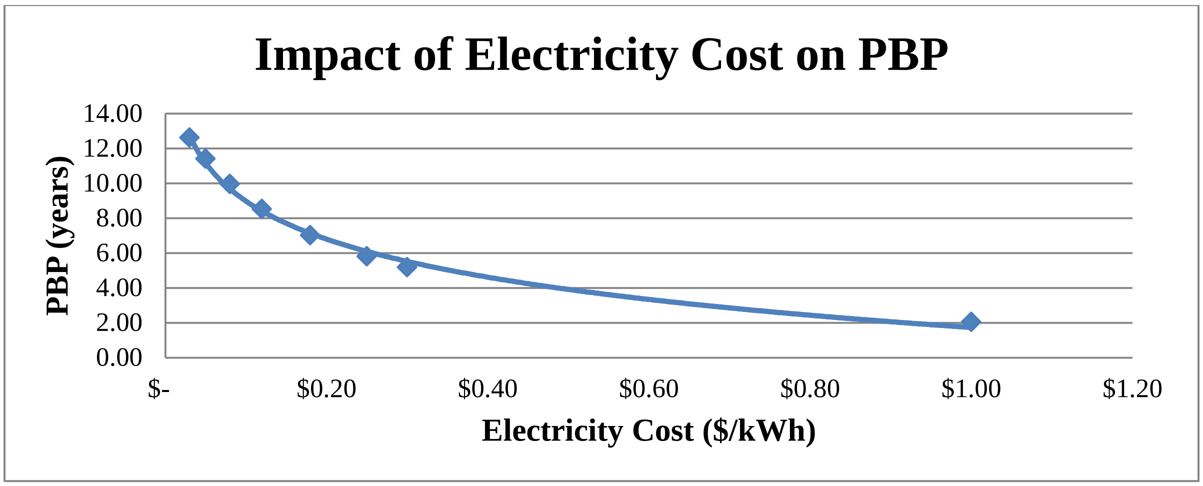


Figure 33 Impact of electricity cost on payback period (waste disposal cost fixed at $75/ton)

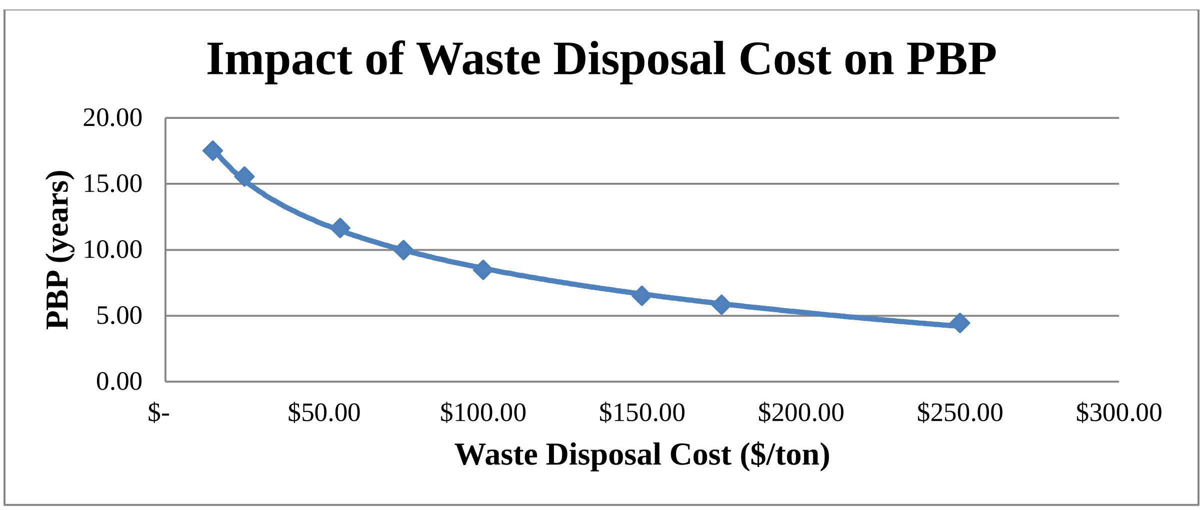


Figure 34 Impact of waste disposal cost on payback period (electricity cost fixed at $0.08/kWh)

7.3.2 Scalability Considerations

The GEM was designed with modularity in mind. While the system was demonstrated as a fully-containerized unit, containerization is not required, nor is it limited to the number of containers demonstrated. Use scenario must be considered prior to designing a solution beyond a three ton per day throughput. Surely, the simple inclusion of additional three ton per day systems can be considered; however, this would not enable enjoyment of economy of scale. Thus, scalability is best addressed at the subsystem level:

- Solid Waste Preprocessor (SWP). The SWP is comprised of COTS and modified equipment that is responsible for converting bulk, co-mingled waste into waste-based fuel pellets. The waste is size reduced, conditioned, and pelletized to achieve this objective. The SWP can be scaled up to several tons per hour throughput without complication, thereby affording for a centralized "pellet plant" that feeds distributed gasification/generation modules. Scale down of the SWP would be a more difficult task, and the recommendation would be to either operate the SWP on a reduced duty cycle or have a centralized SWP feeding distributed gasification/generation modules.
- Gasification. A stratified downdraft gasifier is used to efficiently convert waste pellets into syngas. The system can be readily scaled down to the sub-ten lbs/hr level, although process economics would be questionable at this scale. Downdraft gasification certainly has upper limits for scale. 10-ton/day throughput could be met with the current design approach, while throughputs above this would require a revisit of reactor design. All gas conditioning/clean-up equipment used is readily scaled up and down.
- Controls/Integration Backplane. The controls system and integration framework are highly flexible and are capable of accepting a variety of inputs.

In summary, it is conceivable that the system could be scaled down to sub-ton levels (process economics rather than engineering may be the limiting factor for determining the smallest scale of the system). The flexibility of the system to operate in a distributed fashion (i.e. central preprocessing and distributed gasification/generation) presents an option to address very high throughput (tons per hour) using the existing gasification module. While we have not done so, it is expected that the gasifier could be readily scaled to 10-ton per day throughput without diversion from the fundamental processing approach.

8 IMPLEMENTATION ISSUES

Implementation of the demonstration activity at Edwards Air Force Base experienced a number of delays and unforeseen complications. While the demonstration was ultimately executed, these issues did negatively impact the ability of the project to stay on schedule, within budget, and to meet all of the performance objectives. There were three major categories of issues encountered:

- Regulatory
- End-user Concerns
- Site-specific Shortcomings

8.1 REGULATORY ISSUES

Operation of the demonstration required permits from state and local authorities, an interconnection agreement with the local utility provider, and a license from the Base Commander. Acquiring a license to operate at Edwards Air Force Base was a relatively straightforward activity. This required Infoscitex to submit a request to Edwards with background on the project and basis for request. Infoscitex received the license (AFMC-ED-3-10-006) once a town hall meeting was held at the base and no objections were heard. Throughout the course of the project several extensions were received as required due to the delayed imposed by permitting issues.

Upon initial review of the regulatory environment, it was determined, in conjunction with the team at Edwards Air Force Base and the local regulatory body, that the only permit required for operation of the demonstration was an experimental exemption to be issued by the Eastern Kern Air Pollution Control District (EKAPCD). In March 2011 Infoscitex's request for an Experimental Research Exemption was approved, and the project received a EKAPCD designation number of 110114. With environmental permitting believed to have been addressed, Infoscitex moved forward with acquiring clearance to connect to the local grid at Edwards. Unfortunately, the local utility provider, Southern California Edison, operated was obstructive and lacked responsiveness and full disclosure throughout the process. Although an interconnection application was submitted, this was ultimately abandoned as it became apparent that the application for this project had been bundled with a number of other alternative energy projects at the base. Were the project to stay the course with interconnection, further delay would have been required to accommodate a telemetry study as required due to the aggregate size of the projects.

Concurrent with the pursuit of interconnection approval, Infoscitex continued to pursue required accommodations at the site to ensure a successful operation. During the course of conversations and approval requests for various elements of the project, publicity for the project heightened. As a result, new stakeholders appeared requesting revisit of Infoscitex's permitting status. Corresponding conversations brought into question whether the project would represent a violation of Edwards' landfill permitting due to the GEM WEC System being located at the landfill and thus representing a material change in use scenario from what was described in their permit. This revelation resulted in further delays and at one point put the project at risk of being shut down due to an initial ruling by CalRecycle that the project was not in the best interest of

the public. However, Infoscitex lobbied with CalRecycle and ultimately Edwards Air Force Base received a Project Permit Exemption from the Kern County Environmental Health Division of CalRecycle on 19 March 2012.

In summary, the following regulatory approvals were required to operate the demonstration at Edwards Air Force Base as planned:

5. ***License to Operate at Edwards Air Force Base***
6. ***Experimental Exemption from Eastern Kern Air Pollution Control District (EKAPCD)***
7. ***Permit Exemption from the Environmental Health Division of CalRecycle***
8. ***Generating Facility Interconnection Agreement with Southern California Edison***

Future implementation of the GEM WEC system at a DOD or other installation would not be performed under an experimental exemption. Generally speaking, this would require a Title V permit. Under a Title V permit, the site is defined as either an area source or a major source. Table 23 summarizes the impact the GEM WEC system would have on existing site permit and the steps required to legally operate the GEM WEC. Permitting of the GEM under a full permit can be achieved across Federal and State regulations. Details of how those permits would be obtained are site specific and require Federal level of applicability as well as local state regulations (if applicable). Massachusetts is the only state in the Union that has a moratorium on "waste burning," which they have extended to gasification technologies (although the policy is currently being modified to include pyrolysis and gasification technologies).

Table 23 Summary of Title V permit implications associated with GEM WEC implementation

Permit Type	Impact	Process
Title V major source	GEM emissions must be assessed and evaluated under current emissions across the permitted site against their allowable thresholds.	If the GEM does not cause the facility to exceed the thresholds, then a simple Title V modification to include the GEM on the permit would suffice. A major modification would need to occur if the GEM would increase threshold limits. This may be difficult to achieve; however, the GEM emissions on a ton/year basis is rather insignificant when compared to thresholds and limits of Major Title V permits.
Title V Area source	GEM emissions must be assessed and evaluated under current emissions across the permitted site against their allowable thresholds.	If the GEM trips the thresholds between an area source and a major source a Title V major source permit must be obtained. If not, a modification to add the GEM to the existing Title V area source permit will be required.
State Regulations	Determine GEM applicability to local regulations	Every state has the right to have more stringent air quality regulations than the EPA methods. IST and MSW Power have not prepared an exhaustive list of all the states regulations. Additionally, the states in which the two companies have experience do not have regulations for small scale gasification units. Most states have deferred to EPA regulations.

It is a general rule of thumb that the Northeast region of the United States (primarily Massachusetts) and California have the toughest regulations for permitting such a unit. Most other states have deferred to Federal regulations for permitting. The GEM has been classified by the EPA as an Other Small Waste Incinerator (OSWI) and can be permitted according to 40 CFR 60 subpart EEEE (which varies depending on the system's ability to produce electricity or hot

water/heat). MSW Power has experience in obtaining a letter from the EPA approving the GEM operation at an institutional site (Plymouth County Correctional Facility, Plymouth, MA). This letter is provided for reference in Appendix G.

While an exhaustive analysis of each state and municipality was not practical given the time and funding priorities for this project, some understanding of those states that can be expected to be most receptive to WTE technologies was gained. The following states had active WTE operations in 2011:

- California
- Connecticut
- Delaware
- Florida
- Hawaii
- Indiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- New Hampshire
- New Jersey
- New York
- North Carolina
- Oklahoma
- Oregon
- Pennsylvania
- Utah
- Virginia
- Washington

The presence of active WTE operations is not in and of itself indicative of a region that would be receptive to new WTE activities. An understanding of any local, county, or state moratoriums on expansion must be gained prior to targeting a specific site for technology transfer.

8.2 END-USER CONCERNS

At the onset of the project, it was well-documented and known that the GEM WEC System was not sufficiently sized to process all of the waste heading to Edwards' landfill. It was generally well-excepted that the GEM represented a potential means of slowing the rate at which the landfill was filled, and could possibly aid in landfill extension through processing of waste already in the landfill. However, as it was not a total solution, detractors did exist within the

stakeholder community. As a result of the demonstration, three primary sentiments were observed as it pertained to future use of the GEM at Edwards:

1. ***Fear of the unknown***. The GEM represents a marked shift in waste management paradigm, and as such is inherently controversial. Observers characterized as under-informed and/or passersby were noted to exhibit some apprehension over the use of a thermal conversion process to address waste burden. As a technology without documented track record, some expressed concern over safety and environmental impact.
2. ***Ash quality***. In other studies, the GEM has been shown to produce ash streams that are below contaminant threshold for classification as hazardous waste (i.e. innocuous and suitable for landfill disposal). However, due to the unexpected high metal content and lack of active metal separation to address it, ash analysis indicated the GEM ash produced at Edwards AFB to be hazardous (see Appendix E for report).
3. ***Cost benefit***. As noted in this report, the reduced throughput experienced due to composition of the waste stream yields a poor cost benefit result for the GEM at Edwards Air Force Base. In the absence of other compelling factors, cost (and specifically return on investment) will drive decisions regarding suitability of the GEM for candidate sites.

8.3 SITE-SPECIFIC SHORTCOMINGS

Due to delays imposed by regulatory issues, the waste stream at Edwards Air Force Base experienced some change between project kick-off and demonstration initiation. Specifically, a major detractor of demonstration results was the high metal content of the waste stream. Due to a large portion of the waste diverted for use in this demonstration coming from residential streams at the base (as opposed to cafeteria or industrial streams), the waste was observed to contain a broad range of items including hazardous waste, electronic waste, and wiring that would not typically find its way to landfill if derived from a cafeteria or industrial source. As a result, the throughput of the gasifier was much lower due to both reduced combustible content in the waste and some jamming at the pellet mill. This, coupled with end-user concerns, ultimately led to the system not being retained by Edwards Air Force Base for continued use.

8.4 TECHNOLOGY OUTLOOK

The GEM technology was originally developed for the processing of feeding wastes in the combat theatre. This type of feedstock contained by weight 44% food, 42% paper/cardboard and 14% plastic. This blend of material was used for optimizing the GEM process. Edwards AFB waste contained both office and residential wastes, with residential being the predominant weight fraction. The waste that was tested at Edwards AFB had several tough components for processing. First, the waste was high in moisture, reducing the processing rate through the drying in order to properly dry the material. MSW Power has the ability to use a larger drying bed, which would increase the processing rate of high moisture feedstock. Additionally, Edwards AFB waste contained significant amount of inorganic material including a substantial amount of metals. These metals were in the form of aluminum and steel cans, miscellaneous

household items, and wiring. MSW Power encourages that these items be recycled. However, it is naïve to think that metal objects would not enter the waste stream. On MSW Power's second generation GEM unit, an inline metal separation unit removes 99% of ferrous, non-ferrous, glass and other ceramic materials from the waste material. This increases system robustness and output. The Edwards AFB waste stream had samples that returned with as high as 30% by weight of inorganic material in the pellet. This reduces the BTU content and processing rate of the waste pellet through the reactor significantly. At 30% inorganics in the pellet, the syngas BTU content is below 100 BTU/ cubic foot. Additionally, the high amount of inorganic material in the reactor slowed down the processing rate, as the control system had not previously seen inorganic content that high. By reducing the metals and glass components the GEM would have operated closer to its targeted operation parameters.

Therefore, when evaluating sites for future GEM installations, it is important to look at the following criteria:

- Source of material
    - Cafeteria and an office waste are ideal due to composition. Residential waste contains a significant amount of inorganic material that should be considered for recycling rather than processing through a waste to energy system.
- Moisture content
    - The GEM can handle a wide range of moisture contents; however, proper selection of system variant requires a solid understanding of the max, average and minimum values of moisture content of the waste. Depending on the typical moisture content, an appropriate preprocessing subsystem can be specified.
- Understanding inorganic material
    - MSW Power has designed preprocessing subsystem options featuring a metal separation process that can eliminate a substantial amount of inorganic material prior to the pelletizing process. This subsystem option should be included in future DoD installations.
- Heat Requirements
    - In order to optimize ROI, sites having the ability to make use of the waste heat captured by the system are preferred. The heat can be used for HVAC or hot water applications.
- Costs
    - For an attractive ROI, site operating costs should at least meet the following, which would result in a PBP of less than seven (7) years:
        - Disposal costs > $100/ton
        - Electrical costs > $.08/kWh
        - Heating Costs > $0.05/kWth

9 REFERENCES

1. Energy Information Administration. Annual Energy Review, 2011.
2. Miller, E., "DoD Solid Waste Diversion," presented at Environment, Energy Security & Sustainability Symposium & Exhibition, May 2011.
3. Department of Defense. Annual Energy Management Report Fiscal Year 2011.
4. Statement of Mr. Philip W. Grone, Deputy Under Secretary of Defense (Installations and Environment) Before the Subcommittee on Economic Development, Public Buildings and Emergency Management of the House Transportation and Infrastructure Committee, July 19, 2007.
5. "Strengthening Federal Environmental, Energy, and Transportation Management." Executive Order (EO) 13423, January 24, 2007; *Federal Register*, *72 (17)*, January 26, 2007.
6. Natural Gas Monthly, June 2008, Energy Information Administration, Office of Oil and Gas, U.S. Department of Energy, Washington, DC, 2008.
7. "DoD Integrated (Non-Hazardous) Solid Waste Management Policy." Office of the Under Secretary of Defense, Washington, DC, February 1, 2008; http://cc.bingj.com/cache.aspx?q=DoD+Integrated+(Non-Hazardous)+Solid+Waste+management+Policy&d=4643491110915324&mkt=en-US&setlang=en-US&w=a54a86a7,482fa0fb
8. "The Integrated Waste Management Act," AB939, State of California, 1989.
9. Municipal Solid Waste (MSW), 2008; http://www.epa.gov/garbage/facts.htm.
10. "Air Force Energy Plan," http://www.safie.hq.af.mil/shared/media/document/AFD-091208-027.pdf
11. "Waste Management - 2008 US Cities Sustainability Ranking," http://www.sustainlane.com/us-city-rankings/categories/waste-management.
12. Gold, H., Cushman, M., Ocnos, G., Diebold, J. and Lilley, A., "Low Parasitic Loss Solid Waste Preprocessor for Forward Waste to Energy Conversion," Contract No. W91NF-06-C-0035, Final Report ARO 1147, U.S. Army Research Office, Durham, NC June 2006.
13. Gold, H., Young, M., Armstrong, S. and Cushman, M., "Low Parasitic Loss Solid Waste Preprocessor for Forward Waste to Energy Conversion," Contract No. W91NF-06-C-0035, Final Report ARO 1188, U.S. Army Research Office, Durham, NC, October 1, 2009.
14. Ruppert, W.H., Bush, T.A., Verdonik, D.P., Geiman, J.A. and Harrison, M.A., "Force Provider Solid Waste Characterization Study," Final Report Natick/TR-04/017, Contract No. DAAD16-00-C-1005, U.S. Army Research, Development and Engineering Command, Natick Soldier Center, Natick, MA, August 2004.
15. Gold, H., Cushman, M., Stevenson, W. and Reed, T.B., "Clean Burning Waste Gasifier to Produce Tar-Free Gas for Internal Combustion Engines," Contract No. W56HZV-05-C-0112, Final Report TACOM 1099, U.S. Army Tank-Automotive and Armaments Command (TACOM), Warren, MI, August 2005.
16. Gold, H., Young, M., Armstrong, S., Cushman, M., and Ocnos, G., "Clean Burning Waste Gasifier to Produce Tar-Free Gas for Internal Combustion Engines," Contract No. W56HZV-05-C-0661, Final Report TACOM 1157-8, U.S. Army Tank-Automotive and Armaments Command (TACOM), Warren, MI, March 2008.
17. "Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Third Edition" U.S. Environmental Protection Agency, September 2006.

18. "CARB Large Spark Ignition Exhaust Emission Standards," http://www.arb.ca.gov/msprog/offroad/lsi.pdf
19. "Nonroad Large Spark-Ignition Engines – Exhaust and Evaporative Emission Standards," Environmental Protection Agency," http://www.epa.gov/otaq/standards/nonroad/largesi.htm
20. "Department of Defense Base Structure Report (A Summary of DoD's Real Property Inventory) Fiscal Year 2009 Baseline," Office of Deputy Under Secretary of Defense (Installations and Environment), Washington, DC, 2009.
21. "Joint Technical Document, Main Base Active Landfill, Edwards Air Force Base, California", 95 Air Base Wing, Environmental Division, Air Force Flight Test Center, Edwards Air Force Base, California, June 2009.
22. "Title 14 California Code of Regulations (CCR), Natural Resources, Chapter 3.1, Composting Operations Regulatory Requirements, Article 6, Composting Operating Standards," http://www.calrecycle.ca.gov/Laws/Regulations/Title14/ch31a5.htm.
23. Reed, T.B. and Das, A., "Handbook of Biomass Downdraft Gasifier Engine Systems," Solar Energy Research Institute (SERI), SERI/SP-271-3022, DE 88001135, The Biomass Energy Foundation Press, Golden, Co, 1988.
24. "Testo 335: Industrial Combustion Analyzer," http://www.testo350.com/335.html

APPENDICES

Appendix A: Points of Contact

POINT OF CONTACT Name	ORGANIZATION Name Address	Phone Fax E-mail	Role in Project
Michael Cushman	Infoscitex Corporation 303 Bear Hill Rd, Waltham MA 02451	(781) 419-6377 mcushman@infoscitex.com	Principal Investigator
Matthew Young	MSW Power Corporation (formerly IST Energy)	(978) 264-0679 x225 myoung@mswpower.com	co-Principal Investigator
Steven Madoski	Edwards Air Force Base 412TW/CEVC	Steven.Madoski@edwards.af.mil	Demo Site POC

Appendix B: Start-Up Log

IST Energy

IST Energy Start Up Checklist

Motor Rotation and Current

Front End Hopper Door Motor

Rotation Check: ✓ Current Draw (Amps): 1.27

Shredder Motor #1

Rotation Check: ✓ Current Draw (Amps): 13.0

Shredder Motor #2

Rotation Check: ✓ Current Draw (Amps): 13.0

Belt Conveyor Motor

Rotation Check: ✓ Current Draw (Amps): 1.35

Dryer Motor

Rotation Check: ✓ Current Draw (Amps): 1.32

Dryer Auxiliary Heater Motor

Rotation Check: ✓ Current Draw (Amps): .8

Dryer Exhaust Blower Motor

Rotation Check: ✓ Current Draw (Amps): .92

Dry Shred Agitator Motor

Rotation Check: ✓ Current Draw (Amps): .93

Dry Shred Conveyor Motor

Rotation Check: ✓ Current Draw (Amps): 1.84

Pellet Mill Conditioner Motor

Rotation Check: ✓ Current Draw (Amps): 1.50

303 Bear Hill Road
Waltham, MA 02451-1016
www.istenergy.com
Ph: 781-890-1338 Fx: 781-890-1330

IST Energy

Pellet Mill Force Feeder Motor

Rotation Check: ✓ Current Draw (Amps): .2

Pellet Mill Die Motor

Rotation Check: ✓ Current Draw (Amps): 16.6

Pellet Silo Conveyor Motor

Rotation Check: ✓ Current Draw (Amps): 2-5

Pellet to Reactor Conveyor Motor

Rotation Check: ✓ Current Draw (Amps): 2.14

Grate Drive #1 Motor

Rotation Check: ✓ Current Draw (Amps): .28

Grate Drive #2 Motor

Rotation Check: ✓ Current Draw (Amps): .29

Ash Auger #1 Motor

Rotation Check: ✓ Current Draw (Amps): 1.02

Ash Auger #2 Motor

Rotation Check: ✓ Current Draw (Amps): 1.1

HX Blower Motor

Rotation Check: ✓ Current Draw (Amps): 1.5

Rx Blower Motor

Rotation Check: ✓ Current Draw (Amps): 4.0

2nd Air Blower

Rotation Check: ✓ Current Draw (Amps): .9

303 Bear Hill Road
Waltham, MA 02451-1016
www.istenergy.com
Ph: 781-890-1338 Fx: 781-890-1330

IST Energy

Generator Gas Conditioner Blower

Rotation Check: ✓ Current Draw (Amps): .75

Variable Frequency Drives

	25%	50%	75%	100%
Belt Conveyor Motor	✓	✓	✓	✓
Dryer Exhaust Blower	✓	✓	✓	✓
Pellet Mill Force Feeder	✓	✓	✓	✓
Pellet Conveyor to Rx	✓	✓	✓	✓
Auxiliary Heater Blower	✓	✓	✓	✓
Heat Exchanger Blower	✓	✓	✓	✓
Reactor Blower	✓	✓	✓	✓
Ash Auger #1	✓	✓	✓	✓
2nd Air Blower	✓	✓	✓	✓

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IST Energy

Pneumatic System

Overall system pressure: 98.0

Shredder Level Blow-off Right operated: pass / fail

Shredder Level Blow-off Left operated: pass / fail

Dryer Inlet Level Blow-off operated: pass / fail

Dryer Shred Storage T-hopper Level Blow-off operated: pass / fail

Mini Hopper Level Sensor Blow-off operated: pass / fail

Pellet Storage Level Sensor Blow-off operated: pass / fail

Lid Solenoid operated: pass / fail

Filter A Bag #1 cleanout manifold operated: pass / fail

Filter A Bag #2 cleanout manifold operated: pass / fail

Filter A Bag #3 cleanout manifold operated: pass / fail

Filter B Bag #1 cleanout manifold operated: pass / fail

Filter B Bag #2 cleanout manifold operated: pass / fail

Filter B Bag #3 cleanout manifold operated: pass / fail

Valve System

Secondary Air Prop. Valve #1

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #2

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #3

303 Bear Hill Road
Waltham, MA 02451-1016
www.istenergy.com
Ph: 781-890-1338 Fx: 781-890-1330

IST Energy

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #4

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #5

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #6

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Secondary Air Prop. Valve #7

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Filter A inlet

Open: ✓ Closed: ✓

Filter A outlet

Open: ✓ Closed: ✓

Filter B inlet

Open: ✓ Closed: ✓

Filter B outlet

Open: ✓ Closed: ✓

Generator Valve

Open: ✓ Closed: ✓

Flare Valve

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Cyclone Top Valve

303 Bear Hill Road
Waltham, MA 02451-1016
www.istenergy.com
Ph: 781-890-1338 Fx: 781-890-1330

IST Energy

Open: ✓ Closed: ✓

Cyclone Bottom Valve

Open: ✓ Closed: ✓

Ash Removal Top Valve

Open: ✓ Closed: ✓

Ash Removal Bottom Valve

Open: ✓ Closed: ✓

Reactor Lid Slide Valve

Open: ✓ Closed: ✓

Waste heat to dryer Damper

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Waste heat to building Damper

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Auxiliary heater damper

25%: ✓ 50%: ✓ 75% ✓ 100% ✓

Thermocouples

GTC 1-1: Pass / Fail		**GTC 1-2:** Pass / Fail	
GTC 2-1: Pass / Fail	**GTC 2-2:** Pass / Fail	**GTC 2-3:** Pass / Fail	**GTC 2-4:** Pass / Fail
GTC 3-1: Pass / Fail	**GTC 3-2:** Pass / Fail	**GTC 3-3:** Pass / Fail	**GTC 3-4:** Pass / Fail
GTC 4-1: Pass / Fail	**GTC 4-2:** Pass / Fail	**GTC 4-3:** Pass / Fail	**GTC 4-4:** Pass / Fail
GTC 5-1: Pass / Fail	**GTC 5-2:** Pass / Fail	**GTC 5-3:** Pass / Fail	**GTC 5-4:** Pass / Fail
GTC 6-1: Pass / Fail	**GTC 6-2:** Pass / Fail	**GTC 6-3:** Pass / Fail	**GTC 6-4:** Pass / Fail

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GTC 7-1: Pass / Fail **GTC 7-2:** Pass / Fail **GTC 7-3:** Pass / Fail **GTC 7-4:** Pass / Fail

GTC 8-1: Pass / Fail **GTC 8-2:** Pass / Fail **GTC 8-3:** Pass / Fail **GTC 8-4:** Pass / Fail

GTC 9-1: Pass / Fail **GTC 9-2:** Pass / Fail

Cyc In: Pass / Fail

HXTC1: Pass / Fail **HXTC2:** Pass / Fail **HXTC3:** Pass / Fail **HXTC4:** Pass / Fail

FTCA: Pass / Fail **FTCB:** Pass / Fail **PBTC1:** Pass / Fail

Dryer Inlet TC: Pass / Fail **Dryer Outlet TC:** Pass / Fail

Pellet Mill Die TC: Pass / Fail

Flare TC1: Pass / Fail **Flare TC2:** Pass / Fail

Pressure

Gasifier Differential Pressure Sensors (dP)

GTC 9-2 dP: Plumbed: ✓ Reading: 0.3 Positive Pressure Reading: 4.5

Gasifier dP: Plumbed: ✓ Reading: 0.2 Positive Pressure Reading: 4.5

Cyclone and Heat Exchanger dP : Plumbed: NA Reading: NA Positive Pressure Reading: NA

Filter A dP: Plumbed: ✓ Reading: .1 Positive Pressure Reading: 26.5

Filter B dP: Plumbed: ✓ Reading: .1 Positive Pressure Reading: 26.5

Reactor Blower dP: Plumbed: ✓ Reading: -.01 Positive Pressure Reading: 4.7

Venturi dP: Plumbed: ✓ Reading: 0.0 Positive Pressure Reading: 1.5

Waste Heat dP to Dryer: Plumbed: ✓ Reading: .56 Positive Pressure Reading: .56

Waste Heat dP to building: Plumbed: ✓ Reading: .59 Positive Pressure Reading: .54

Dryer Exhaust dP: Plumbed: ✓ Reading: 0.2 Positive Pressure Reading: 1.3

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Level

-Shredder High:	Low signal: ✓	High Signal ✓
Shredder Mid:	Low signal: ✓	High Signal ✓
Shredder Low:	Low signal: ✓	High Signal ✓
Dryer Inlet:	Low signal: ✓	High Signal ✓
Dry Shred Storage High:	Low signal: ✓	High Signal ✓
Mini ~~Reactor~~ hopper:	Low signal: ✓	High Signal ✓
Reactor High:	Low signal: ✓	High Signal ✓
Ash Removal Barrel:	Low signal: ✓	High Signal ✓

Moisture

Moisture Inlet:	No Material Reading: 0	Sample Reading: NA	Known Sample Moisture: NA
Moisture Outlet:	No Material Reading: 4	Sample Reading: NA	Known Sample Moisture: NA

Motion Sensors

Ash Auger #1 RPM:	Operational Reading: 36.1
Ash Auger #2 RPM:	Operational Reading: 35.8
Grate 1 RPM:	Operational Reading: .21
Grate 2 RPM:	Operational Reading: .21

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Heaters

Char Igniter #1: Pass / Fail

Pipe Heater #1: Pass / Fail

Pipe Heater #2: Pass / Fail

Pipe Heater #3: Pass / Fail

Pipe Heater #4: Pass / Fail

Dryer Auxiliary Heater: Pass / Fail

Flowmeters

Waste Heat to Dryer flowmeter: No flow reading: 20 50% HX Blower Speed flow reading: 757

Total Waste Heat: No flow reading: 15 50% HX Blower Speed flow reading: 753

Syngas flowmeter: No flow reading: 0 50% RX Blower Speed flow reading: 131

Misc Sensors/Instrumentation

Scale: Tare reading: 0 Known Weight: 50 Scale with known weight reading: 50

Flare Igniter: Pass / Fail

Shredder discharge vibrators: Pass / Fail

Cyclone Ash Vacuum pump: Pass / Fail

Transition Hopper Limit Sensor: Pass / Fail

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Equipment Checks

Shredder

Verify that the Access door is closed: Yes / No

Verify that the shredder is empty: Yes / No

Shredder Conveyor

Verify that the dust covers are installed: Yes / No

Verify that the metal collection bin is in place: Yes / No

Verify that the conveyor belt has tension: Yes / No

Perform an inspection of the conveyor belt seams: Checked

Dryer

Moisture sensor mounting bolts torque spec: ✓

Dryer Exhaust

Verify that the particulate filter is installed: ✓

Dry Shred Conveyor

Verify that the agitation paddle is installed: ✓

Verify that the dry shred hopper safety cover is installed: ✓

Pellet Mill

Verify that the pellet mill door is closed and secure latched: ✓

Pellet Mill T-Hopper

Verify that the safety cover is installed ✓

Pellet Silo

Verify that the silo top cover is installed and secured: ✓

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Reactor

Verify that all bolts meet their torque spec:

Grate Drawer bolts, Qty: 24 (35 ft-lb Nut):

Grate Drive Motor Bolts, Qty: 4 (65 ft-lb Bolt):

Ash Removal Flange bolts, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Upper ash removal valve, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Lower ash removal valve, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Upper Cyclone Valve, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Lower Cyclone Valve, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Cyclone Discharge Flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Heat Exchanger Inlet Flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Heat Exchanger Discharge flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Filter A inlet flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Filter B inlet flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Filter A discharge flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Filter B discharge flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Filter discharge pipe tee flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Venturi inlet pipe flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Venturi discharge pipe flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Blower inlet flange, Qty: 16, (35 ft-lb nut):

Blower discharge flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut):

Flare valve flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut)

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Generator valve flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut): ✓

Gas discharge to generator flange , Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut): ✓

Flare flange, Qty: 8, (220 ft-lb Bolt, 190 ft-lb Nut): ✓

Verify that the each flange has a gasket

High temperature gaskets

Ash removal to Base Flange: ✓

Ash Removal Flange contain high temperature gasket: ✓

5" base to cyclone pipe run #1: ✓

5" base to cyclone pipe run #2: ✓

5" base to cyclone pipe run #3: ✓

Cyclone Discharge Flange: ✓

Heat Exchanger Inlet Flange: ✓

Fiberglass seal on the heat exchanger inlet plenum ✓

Fiberglass seal on the discharge heat exchanger plenum ✓

Low temperature gaskets

Heat Exchanger discharge flange ✓

Filter discharge pipe tee flange ✓

Venturi inlet flange ✓

Venturi discharge flange ✓

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Gas discharge to generator flange ✓

Flare flange ✓

Verify that the pipe insulation is tightly secured to the pipe:

5" gas line from reactor base to cyclone ✓

Waste heat line ✓

Verify the installation of 9 filter bags installed in each baghouse unit

Filter A ✓

Filter B ✓

Verify the baghouse door is tightly secured to the baghouse unit

Filter A ✓

Filter B ✓

Verify the reactor roof cover is secured ✓

Inspected by: John F Costa

Signature: John F Costa

Date: 5-11-12

Approved by: Matthew Young

Signature:

Date: 5/11/12

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Appendix C: Pellet Characterization

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date	August 21 2012
HRI Project	002-ENQ
HRI Series No.	H19/12-1
Date Rec'd.	08/07/12
Cust. P.O.#	

Ist Energy
Aaron Salter
303 Bear Hill Road
Waltham, ME 02451

Sample Identification
July 12th

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	3.88	0.00	3.88
Ash	9.90	10.30	9.90
Volatile	75.56	78.61	75.56
Fixed C	10.66	11.09	10.66
Total	100.00	100.00	100.00
Sulfur	0.059	0.061	0.059
Btu/lb (HHV)	8853	9210	8853
Btu/lb (LHV)	8241	8615	
MMF Btu/lb	9913	10363	
MAF Btu/lb		10267	
Ultimate (%)			
Moisture	3.88	0.00	3.88
Carbon	49.61	51.61	49.61
Hydrogen	6.17	6.41	6.17
Nitrogen	0.37	0.38	0.37
Sulfur	0.06	0.06	0.06
Ash	9.90	10.30	9.90
Oxygen*	30.01	31.24	30.01
Total	100.00	100.00	100.00
Chlorine**	0.660	0.687	0.660
Air Dry Loss (%)			
Forms of Sulfur, as S, (%)			
Sulfate			
Pyritic			
Organic			
Total	0.06	0.06	
Water Soluble Alkalies (%)			
Na2O			
K2O			

Lb. Alkali Oxide/MM Btu=	
Lb. Ash/MM Btu=	11.18
Lb. SO2/MM Btu=	0.13
Lb. Cl/MM Btu=	0.75
As Rec'd. Sp.Gr.=	
Free Swelling Index=	
F-Factor(dry), DSCF/MM Btu=	9,560

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date	August 21 2012
HRI Project	002-ENQ
HRI Series No.	H19/12-2
Date Rec'd.	08/07/12
Cust. P.O.#	

Ist Energy
Aaron Salter
303 Bear Hill Road
Waltham, ME 02451

Sample Identification
July 16th

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	3.32	0.00	3.32
Ash	16.14	16.69	16.14
Volatile	71.41	73.86	71.41
Fixed C	9.13	9.45	9.13
Total	100.00	100.00	100.00
Sulfur	0.141	0.146	0.141
Btu/lb (HHV)	8064	8341	8064
Btu/lb (LHV)	7459	7751	
MMF Btu/lb	9767	10176	
MAF Btu/lb		10012	
Ultimate (%)			
Moisture	3.32	0.00	3.32
Carbon	48.04	49.69	48.04
Hydrogen	6.15	6.36	6.15
Nitrogen	0.92	0.95	0.92
Sulfur	0.14	0.15	0.14
Ash	16.14	16.69	16.14
Oxygen*	25.29	26.16	25.29
Total	100.00	100.00	100.00
Chlorine**	1.160	1.200	1.160

Air Dry Loss (%)		
Forms of Sulfur,as S,(%)		
Sulfate		
Pyritic		
Organic		
Total	0.14	0.15
Water Soluble Alkalies (%)		
Na2O		
K2O		

Lb. Alkali Oxide/MM Btu=	
Lb. Ash/MM Btu=	20.02
Lb. SO2/MM Btu=	0.35
Lb. Cl/MM Btu=	1.44
As Rec'd. Sp.Gr.=	
Free Swelling Index=	
F-Factor(dry),DSCF/MM Btu=	10,474

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
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Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
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Fax: (303) 278-1528

Date	August 21 2012
HRI Project	002-ENQ
HRI Series No.	H19/12-3
Date Rec'd.	08/07/12
Cust. P.O.#	

Ist Energy
Aaron Salter
303 Bear Hill Road
Waltham, ME 02451

Sample Identification
July 17th

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	3.48	0.00	3.48
Ash	19.56	20.27	19.56
Volatile	74.59	77.28	74.59
Fixed C	2.37	2.45	2.37
Total	100.00	100.00	100.00
Sulfur	0.134	0.139	0.134
Btu/lb (HHV)	8602	8912	8602
Btu/lb (LHV)	7900	8222	
MMF Btu/lb	10907	11411	
MAF Btu/lb		11177	
Ultimate (%)			
Moisture	3.48	0.00	3.48
Carbon	51.21	53.06	51.21
Hydrogen	7.18	7.44	7.18
Nitrogen	0.94	0.97	0.94
Sulfur	0.13	0.14	0.13
Ash	19.56	20.27	19.56
Oxygen*	17.50	18.12	17.50
Total	100.00	100.00	100.00
Chlorine**	0.709	0.735	0.709

Air Dry Loss (%)		
Forms of Sulfur, as S, (%)		
Sulfate		
Pyritic		
Organic		
Total	0.13	0.14

Water Soluble Alkalies (%)

Na2O
K2O

Lb. Alkali Oxide/MM Btu=	
Lb. Ash/MM Btu=	22.74
Lb. SO2/MM Btu=	0.31
Lb. Cl/MM Btu=	0.82
As Rec'd. Sp.Gr.=	
Free Swelling Index=	
F-Factor(dry), DSCF/MM Btu=	11,236

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

HAZEN
Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Date	August 21 2012
HRI Project	002-ENQ
HRI Series No.	H19/12-4
Date Rec'd.	08/07/12
Cust. P.O.#	

Ist Energy
Aaron Salter
303 Bear Hill Road
Waltham, ME 02451

Sample Identification
July 20th

Reporting Basis >	As Rec'd	Dry	Air Dry
Proximate (%)			
Moisture	2.60	0.00	2.60
Ash	29.67	30.46	29.67
Volatile	61.06	62.69	61.06
Fixed C	6.67	6.85	6.67
Total	100.00	100.00	100.00
Sulfur	0.087	0.089	0.087
Btu/lb (HHV)	7063	7251	7063
Btu/lb (LHV)	6607	6811	
MMF Btu/lb	10394	10808	
MAF Btu/lb		10428	
Ultimate (%)			
Moisture	2.60	0.00	2.60
Carbon	36.39	37.36	36.39
Hydrogen	4.63	4.75	4.63
Nitrogen	0.27	0.28	0.27
Sulfur	0.09	0.09	0.09
Ash	29.67	30.46	29.67
Oxygen*	26.35	27.06	26.35
Total	100.00	100.00	100.00
Chlorine**	0.758	0.778	0.758

	As Rec'd	Dry
Air Dry Loss (%)		
Forms of Sulfur, as S, (%)		
Sulfate		
Pyritic		
Organic		
Total	0.09	0.09
Water Soluble Alkalies (%)		
Na2O		
K2O		

Lb. Alkali Oxide/MM Btu=	
Lb. Ash/MM Btu=	42.01
Lb. SO2/MM Btu=	0.25
Lb. Cl/MM Btu=	1.07
As Rec'd. Sp.Gr.=	
Free Swelling Index=	
F-Factor(dry),DSCF/MM Btu=	8,565

Report Prepared By:

Gerard H. Cunningham
Fuels Laboratory Supervisor

* Oxygen by Difference.
** Not usually reported as part of the ultimate analysis.

HAZEN

Hazen Research, Inc.
4601 Indiana Street
Golden, CO 80403 USA
Tel: (303) 279-4501
Fax: (303) 278-1528

Ist Energy
Aaron Salter
303 Bear Hill road
Waltham, MA 02451

Date:	Aug. 21, 2012
Project No:	002-ENQ
Control No:	H19/12
Received:	08/07/12

Sample Number: H19/12	-1	-2	-3	-4
Sample Identification:	July 12th	July 16th	July 17th	July 20th
As Received Moisture, %	3.88	3.32	3.48	2.60
Water Soluble Chloride (As Received Basis), %	0.24	0.27	0.36	0.13
Water Soluble Chlorine (Dry Basis), %	0.25	0.28	0.37	0.13

By:
Gerard H. Cunningham
Fuel Laboratory Manager

Appendix D: Example Ash Sample Log

ASH Sample Log

Page 1

ate	Time	ID#	Stored location	Type
/21/12	1617	062112AA	Tours Sat. Accum. Area	Bottom
/5/12	xxxx	070512AA	" "	Bottom
11/12	xxxx	071112AA	" "	Bottom
12/12	xxxx	071212AA	" "	Bottom
/12/12	xxxx	071212AB	" "	Bottom
10/12	xxxx	071012AA	" "	Bottom
/1?/12	1600	07[illegible]12AA	" "	Bottom + cyclone
/18/12	1600	071812AA	" "	Bottom
/19/12	1600	071912AA	" "	Bottom + cyclone
/20/12	1600	072012AA	" "	Bottom
24/12	16:30	072412AA		Bottom + Fly
5/12	13:20	072512AA		Bottom
6/12	11:45	072612AA		Bottom + Fly
6/12	16:30	072612AB		Bottom
7/12	16:20	072712AA		Bottom + Fly
0/12	16:00	073012AA		Bottom + Fly
31/12	16:10	073112AA		Bottom + Fly
/12	16:30	080112AA		Bottom + Fly
2/12	16:25	080212AA		" "
3/12	16:20	080812AA		" "
7/12	16:30	080912AA		" "
4/12	04:02	081412AA		Bottom
4/12	20:09	081412AB		Bottom + Fly
5/12	15:29	081512AA		Bottom
/12	17:48	081612AA		Bottom + Fly
1/12	0[illegible]	091812AA		Bottom + Fly
1/12	14:44	091812AB		Bottom + Fly
/12	~~[illegible]~~ 23:45	091812AE		Bottom + Fly
1/12	09:02	091912AA		Bottom + Fly
19/12	13:30	091912AB		Bottom + Fly

Appendix E: Edwards Air Force Base Ash Analysis

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1 2 3 4 5 6 7 8 9 10 11 12 13

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-17303-1
Client Project/Site: Ash
Revision: 1

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Amy Harris

Authorized for release by:
8/7/2012 3:03:38 PM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

LINKS

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Have a Question? Ask The Expert

Visit us at:
www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17303-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-17303-1	SI-W1comp-071112	Solid	07/11/12 14:05	07/13/12 17:27
440-17303-2	S2-W2comp-071112	Solid	07/11/12 14:15	07/13/12 17:27
440-17303-3	S3-W3comp-071112	Solid	07/11/12 14:25	07/13/12 17:27

1 2 3 4 5 6 7 8 9 10 11 12 13

Job ID: 440-17303-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-17303-1

Comments
This is a partial report. The final report is pending dioxin data.

Receipt
The samples were received on 7/13/2012 5:27 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 22.0º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-40244 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

Subcontract
SOLID, 8290, Dioxins/Furans with Totals
Samples: 1, 2, 3
Due to sample matrix, in order to minimize possible matrix interferences a 2.0 gram aliquot was extracted for analysis instead of 10 grams. The reporting limits have been raised accordingly.
Analytical results for 2,3,7,8-TCDF are reported from the confirmation data analyzed on August 3, 2012. The data is reported with a “CON” flag.
Samples: 1, 3
Some analytes in these samples have an ion abundance ratio that is outside of criteria. The analytes are considered as an "estimated maximum possible concentration" (EMPC) because the quantitation is based on the theoretical ion abundance ratio. Analytical results are reported with a "Q" flag.

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: SI-W1comp-071112

Date Collected: 07/11/12 14:05
Date Received: 07/13/12 17:27

Lab Sample ID: 440-17303-1
Matrix: Solid

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	6.4		4.7	0.96	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total TCDD	110		4.7	0.96	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,7,8-PeCDD	17	J	24	2.5	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total PeCDD	140		24	2.5	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,4,7,8-HxCDD	12	J Q	24	0.96	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,6,7,8-HxCDD	16	J	24	0.79	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,7,8,9-HxCDD	41		24	0.71	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total HxCDD	180		24	0.81	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,4,6,7,8-HpCDD	120		24	1.2	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total HpCDD	210		24	1.2	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
OCDD	180		47	2.8	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
2,3,7,8-TCDF	120	CON	4.7	1.2	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total TCDF	3700		4.7	2.6	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,7,8-PeCDF	120		24	4.7	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
2,3,4,7,8-PeCDF	190		24	4.9	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total PeCDF	2400		24	4.8	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,4,7,8-HxCDF	260		24	3.0	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,6,7,8-HxCDF	130		24	2.5	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
2,3,4,6,7,8-HxCDF	160		24	2.7	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,7,8,9-HxCDF	12	J	24	3.0	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total HxCDF	1300		24	2.8	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,4,6,7,8-HpCDF	390		24	1.6	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
1,2,3,4,7,8,9-HpCDF	67		24	1.9	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
Total HpCDF	750		24	1.8	pg/g		07/23/12 10:00	08/02/12 11:27	4.71
OCDF	250		47	1.3	pg/g		07/23/12 10:00	08/02/12 11:27	4.71

Internal Standard	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*77*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,7,8-PeCDD	*71*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,6,7,8-HxCDD	*79*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,4,6,7,8-HpCDD	*80*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-OCDD	*72*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-2,3,7,8-TCDF	*75*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,7,8-PeCDF	*69*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,4,7,8-HxCDF	*78*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*
13C-1,2,3,4,6,7,8-HpCDF	*80*		*40 - 135*	*07/23/12 10:00*	*08/02/12 11:27*	*4.71*

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	30	B	0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Arsenic	1.2		0.50	0.45	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Barium	280		0.50	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Beryllium	0.15	J	0.30	0.050	mg/Kg		07/22/12 18:43	07/24/12 12:25	20
Cadmium	15		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Chromium	240		1.0	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Cobalt	9.6		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Copper	7800		10	2.5	mg/Kg		07/22/12 18:43	07/24/12 16:24	200
Lead	110		0.50	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Molybdenum	13		1.0	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Nickel	300		1.0	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Selenium	ND		1.0	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:45	20

Client Sample ID: SI-W1comp-071112

Lab Sample ID: 440-17303-1

Date Collected: 07/11/12 14:05

Matrix: Solid

Date Received: 07/13/12 17:27

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	ND		0.50	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Vanadium	**3.6**		1.0	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:45	20
Zinc	**3200**		100	20	mg/Kg		07/22/12 18:43	07/24/12 12:43	200
Antimony	**160**		1.0	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:45	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/17/12 18:05	07/18/12 14:24	1

Client Sample ID: S2-W2comp-071112

Lab Sample ID: 440-17303-2

Date Collected: 07/11/12 14:15

Matrix: Solid

Date Received: 07/13/12 17:27

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	**30**		4.7	0.99	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total TCDD	**550**		4.7	0.99	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,7,8-PeCDD	**66**		23	2.9	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total PeCDD	**640**		23	2.9	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,4,7,8-HxCDD	**54**		23	0.75	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,6,7,8-HxCDD	**81**		23	0.62	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,7,8,9-HxCDD	**200**		23	0.56	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total HxCDD	**910**		23	0.63	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,4,6,7,8-HpCDD	**720**		23	3.7	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total HpCDD	**1400**		23	3.7	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
OCDD	**1800**		47	4.3	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
2,3,7,8-TCDF	**600**	**CON**	4.7	1.1	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total TCDF	**16000**		4.7	1.6	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,7,8-PeCDF	**500**		23	6.5	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
2,3,4,7,8-PeCDF	**910**		23	6.8	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total PeCDF	**11000**		23	6.7	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,4,7,8-HxCDF	**1500**		23	16	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,6,7,8-HxCDF	**570**		23	13	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
2,3,4,6,7,8-HxCDF	**1100**		23	15	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,7,8,9-HxCDF	**49**		23	16	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total HxCDF	**7200**		23	15	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,4,6,7,8-HpCDF	**3300**		23	2.1	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
1,2,3,4,7,8,9-HpCDF	**300**		23	2.5	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
Total HpCDF	**5600**		23	2.3	pg/g		07/23/12 10:00	08/02/12 12:10	4.69
OCDF	**2200**		47	6.3	pg/g		07/23/12 10:00	08/02/12 12:10	4.69

Internal Standard	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*83*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,7,8-PeCDD	*74*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,6,7,8-HxCDD	*81*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,4,6,7,8-HpCDD	*85*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-OCDD	*80*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-2,3,7,8-TCDF	*82*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,7,8-PeCDF	*76*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,4,7,8-HxCDF	*84*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*
13C-1,2,3,4,6,7,8-HpCDF	*87*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:10*	*4.69*

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: S2-W2comp-071112

Lab Sample ID: 440-17303-2
Date Collected: 07/11/12 14:15
Matrix: Solid
Date Received: 07/13/12 17:27

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	4.7	B	0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Arsenic	0.81		0.50	0.45	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Barium	190		0.50	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Beryllium	0.20	J	0.30	0.050	mg/Kg		07/22/12 18:43	07/24/12 12:27	20
Cadmium	0.42	J	0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Chromium	77		1.0	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Cobalt	6.3		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Copper	9400		10	2.5	mg/Kg		07/22/12 18:43	07/24/12 16:27	200
Lead	53		0.50	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Molybdenum	7.4		1.0	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Nickel	160		1.0	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Selenium	ND		1.0	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Thallium	ND		0.50	0.10	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Vanadium	11		1.0	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:47	20
Zinc	3500		100	20	mg/Kg		07/22/12 18:43	07/24/12 12:45	200
Antimony	13		1.0	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:47	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/17/12 18:05	07/18/12 14:26	1

Client Sample ID: S3-W3comp-071112

Lab Sample ID: 440-17303-3
Date Collected: 07/11/12 14:25
Matrix: Solid
Date Received: 07/13/12 17:27

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	15		5.0	1.9	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total TCDD	620		5.0	1.9	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,7,8-PeCDD	34		25	3.5	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total PeCDD	630		25	3.5	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,4,7,8-HxCDD	25		25	0.79	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,6,7,8-HxCDD	35		25	0.65	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,7,8,9-HxCDD	67		25	0.58	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total HxCDD	560		25	0.66	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,4,6,7,8-HpCDD	150		25	1.1	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total HpCDD	310		25	1.1	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
OCDD	180		50	1.6	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
2,3,7,8-TCDF	270	CON	5.0	2.6	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total TCDF	6800		6.2	6.2	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,7,8-PeCDF	200		25	5.1	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
2,3,4,7,8-PeCDF	350		25	5.3	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total PeCDF	3900		25	5.2	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,4,7,8-HxCDF	380		25	4.1	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,6,7,8-HxCDF	180		25	3.4	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
2,3,4,6,7,8-HxCDF	290		25	3.8	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,7,8,9-HxCDF	7.1	J Q	25	4.1	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total HxCDF	2000		25	3.8	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,4,6,7,8-HpCDF	560		25	13	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
1,2,3,4,7,8,9-HpCDF	49		25	16	pg/g		07/23/12 10:00	08/02/12 12:52	4.95
Total HpCDF	860		25	15	pg/g		07/23/12 10:00	08/02/12 12:52	4.95

Client Sample ID: S3-W3comp-071112
Date Collected: 07/11/12 14:25
Date Received: 07/13/12 17:27

Lab Sample ID: 440-17303-3
Matrix: Solid

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290) (Continued)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
OCDF	150		50	3.8	pg/g		07/23/12 10:00	08/02/12 12:52	4.95

Internal Standard	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*85*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,7,8-PeCDD	*82*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,6,7,8-HxCDD	*85*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,4,6,7,8-HpCDD	*93*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-OCDD	*91*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-2,3,7,8-TCDF	*88*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,7,8-PeCDF	*84*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,4,7,8-HxCDF	*83*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*
13C-1,2,3,4,6,7,8-HpCDF	*86*		*40 - 135*	*07/23/12 10:00*	*08/02/12 12:52*	*4.95*

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**11**	**B**	0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Arsenic	**1.3**		0.50	0.45	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Barium	**250**		0.50	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Beryllium	**0.12**	**J**	0.30	0.050	mg/Kg		07/22/12 18:43	07/24/12 12:38	20
Cadmium	**24**		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Chromium	**110**		0.99	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Cobalt	**4.7**		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Copper	**590**		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Lead	**170**		0.50	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Molybdenum	**9.0**		0.99	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Nickel	**200**		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Selenium	ND		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Thallium	ND		0.50	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Vanadium	**1.4**		0.99	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:55	20
Zinc	**3000**		99	20	mg/Kg		07/22/12 18:43	07/24/12 12:48	200
Antimony	**250**		0.99	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:55	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/17/12 18:05	07/18/12 14:29	1

Lab Chronicle

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17303-1

Client Sample ID: SI-W1comp-071112

Date Collected: 07/11/12 14:05
Date Received: 07/13/12 17:27

Lab Sample ID: 440-17303-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	8290			2.12 g	20 uL	2205104_P	07/23/12 10:00	TL	TAL WSC
Total	Analysis	8290		4.71			2205104	08/02/12 11:27	SO	TAL WSC
Total/NA	Prep	7471A			0.49 g	50 mL	39090	07/17/12 18:05	SN	TAL IRV
Total/NA	Analysis	7471A		1			39564	07/18/12 14:24	DB	TAL IRV
Total/NA	Prep	3050B			2.01 g	50 mL	40244	07/22/12 18:43	CH	TAL IRV
Total/NA	Analysis	6020		20			40546	07/23/12 20:45	NH	TAL IRV
Total/NA	Analysis	6020		20			40650	07/24/12 12:25	NH	TAL IRV
Total/NA	Analysis	6020		200			40650	07/24/12 12:43	NH	TAL IRV
Total/NA	Analysis	6020		200			40735	07/24/12 16:24	YS	TAL IRV

Client Sample ID: S2-W2comp-071112

Date Collected: 07/11/12 14:15
Date Received: 07/13/12 17:27

Lab Sample ID: 440-17303-2
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	8290			2.13 g	20 uL	2205104_P	07/23/12 10:00	TL	TAL WSC
Total	Analysis	8290		4.69			2205104	08/02/12 12:10	SO	TAL WSC
Total/NA	Prep	7471A			0.49 g	50 mL	39090	07/17/12 18:05	SN	TAL IRV
Total/NA	Analysis	7471A		1			39564	07/18/12 14:26	DB	TAL IRV
Total/NA	Prep	3050B			2.01 g	50 mL	40244	07/22/12 18:43	CH	TAL IRV
Total/NA	Analysis	6020		20			40546	07/23/12 20:47	NH	TAL IRV
Total/NA	Analysis	6020		20			40650	07/24/12 12:27	NH	TAL IRV
Total/NA	Analysis	6020		200			40650	07/24/12 12:45	NH	TAL IRV
Total/NA	Analysis	6020		200			40735	07/24/12 16:27	YS	TAL IRV

Client Sample ID: S3-W3comp-071112

Date Collected: 07/11/12 14:25
Date Received: 07/13/12 17:27

Lab Sample ID: 440-17303-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	8290			2.02 g	20 uL	2205104_P	07/23/12 10:00	TL	TAL WSC
Total	Analysis	8290		4.95			2205104	08/02/12 12:52	SO	TAL WSC
Total/NA	Prep	7471A			0.51 g	50 mL	39090	07/17/12 18:05	SN	TAL IRV
Total/NA	Analysis	7471A		1			39564	07/18/12 14:29	DB	TAL IRV
Total/NA	Prep	3050B			2.02 g	50 mL	40244	07/22/12 18:43	CH	TAL IRV
Total/NA	Analysis	6020		20			40546	07/23/12 20:55	NH	TAL IRV
Total/NA	Analysis	6020		20			40650	07/24/12 12:38	NH	TAL IRV
Total/NA	Analysis	6020		200			40650	07/24/12 12:48	NH	TAL IRV

Laboratory References:

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL WSC = TestAmerica West Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Lab Sample ID: G2G230000104B
Matrix: Solid
Analysis Batch: 2205104

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 2205104_P

Analyte	MB Result	MB Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	ND		1.0	0.14	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total TCDD	ND		1.0	0.14	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,7,8-PeCDD	ND		5.0	0.35	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total PeCDD	ND		5.0	0.35	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,4,7,8-HxCDD	ND		5.0	0.24	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,6,7,8-HxCDD	ND		5.0	0.20	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,7,8,9-HxCDD	ND		5.0	0.18	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total HxCDD	ND		5.0	0.24	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,4,6,7,8-HpCDD	ND		5.0	0.14	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total HpCDD	ND		5.0	0.14	pg/g		07/23/12 10:00	08/02/12 10:44	1
OCDD	ND		10	0.40	pg/g		07/23/12 10:00	08/02/12 10:44	1
2,3,7,8-TCDF	ND		1.0	0.21	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total TCDF	ND		1.0	0.21	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,7,8-PeCDF	ND		5.0	0.52	pg/g		07/23/12 10:00	08/02/12 10:44	1
2,3,4,7,8-PeCDF	ND		5.0	0.54	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total PeCDF	ND		5.0	0.54	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,4,7,8-HxCDF	ND		5.0	0.23	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,6,7,8-HxCDF	ND		5.0	0.19	pg/g		07/23/12 10:00	08/02/12 10:44	1
2,3,4,6,7,8-HxCDF	ND		5.0	0.22	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,7,8,9-HxCDF	ND		5.0	0.23	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total HxCDF	ND		5.0	0.23	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,4,6,7,8-HpCDF	ND		5.0	0.17	pg/g		07/23/12 10:00	08/02/12 10:44	1
1,2,3,4,7,8,9-HpCDF	ND		5.0	0.20	pg/g		07/23/12 10:00	08/02/12 10:44	1
Total HpCDF	ND		5.0	0.20	pg/g		07/23/12 10:00	08/02/12 10:44	1
OCDF	ND		10	0.31	pg/g		07/23/12 10:00	08/02/12 10:44	1

Internal Standard	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*77*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,7,8-PeCDD	*71*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,6,7,8-HxCDD	*76*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,4,6,7,8-HpCDD	*73*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-OCDD	*63*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-2,3,7,8-TCDF	*75*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,7,8-PeCDF	*69*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,4,7,8-HxCDF	*80*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*
13C-1,2,3,4,6,7,8-HpCDF	*76*		*40 - 135*	*07/23/12 10:00*	*08/02/12 10:44*	*1*

Lab Sample ID: G2G230000104C
Matrix: Solid
Analysis Batch: 2205104

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2205104_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDD	20.0	21.4		pg/g		107	60 - 138
1,2,3,7,8-PeCDD	100	112		pg/g		112	70 - 122
1,2,3,4,7,8-HxCDD	100	104		pg/g		104	60 - 138
1,2,3,6,7,8-HxCDD	100	109		pg/g		109	68 - 136
1,2,3,7,8,9-HxCDD	100	111		pg/g		111	68 - 138
1,2,3,4,6,7,8-HpCDD	100	110		pg/g		110	71 - 128
OCDD	200	215		pg/g		107	70 - 128

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290) (Continued)

Lab Sample ID: G2G230000104C
Matrix: Solid
Analysis Batch: 2205104

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2205104_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDF	20.0	21.6		pg/g		108	56 - 158
1,2,3,7,8-PeCDF	100	111		pg/g		111	69 - 134
2,3,4,7,8-PeCDF	100	112		pg/g		112	70 - 131
1,2,3,4,7,8-HxCDF	100	110		pg/g		110	74 - 128
1,2,3,6,7,8-HxCDF	100	106		pg/g		106	67 - 140
2,3,4,6,7,8-HxCDF	100	104		pg/g		104	71 - 137
1,2,3,7,8,9-HxCDF	100	108		pg/g		108	72 - 134
1,2,3,4,6,7,8-HpCDF	100	110		pg/g		110	71 - 134
1,2,3,4,7,8,9-HpCDF	100	110		pg/g		110	68 - 129
OCDF	200	203		pg/g		102	63 - 141

Internal Standard	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C-2,3,7,8-TCDD	*77*		*40 - 135*
13C-1,2,3,7,8-PeCDD	*73*		*40 - 135*
13C-1,2,3,6,7,8-HxCDD	*80*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDD	*88*		*40 - 135*
13C-OCDD	*92*		*40 - 135*
13C-2,3,7,8-TCDF	*75*		*40 - 135*
13C-1,2,3,7,8-PeCDF	*73*		*40 - 135*
13C-1,2,3,4,7,8-HxCDF	*78*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDF	*85*		*40 - 135*

Lab Sample ID: G2G230000104L
Matrix: Solid
Analysis Batch: 2205104

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 2205104_P

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2,3,7,8-TCDD	20.0	21.1		pg/g		105	60 - 138	1.4	30
1,2,3,7,8-PeCDD	100	113		pg/g		113	70 - 122	0.48	29
1,2,3,4,7,8-HxCDD	100	110		pg/g		110	60 - 138	5.9	36
1,2,3,6,7,8-HxCDD	100	109		pg/g		109	68 - 136	0.22	36
1,2,3,7,8,9-HxCDD	100	112		pg/g		112	68 - 138	0.89	31
1,2,3,4,6,7,8-HpCDD	100	110		pg/g		110	71 - 128	0.28	28
OCDD	200	214		pg/g		107	70 - 128	0.36	32
2,3,7,8-TCDF	20.0	21.8		pg/g		109	56 - 158	0.70	30
1,2,3,7,8-PeCDF	100	111		pg/g		111	69 - 134	0.19	27
2,3,4,7,8-PeCDF	100	110		pg/g		110	70 - 131	1.3	31
1,2,3,4,7,8-HxCDF	100	105		pg/g		105	74 - 128	4.7	32
1,2,3,6,7,8-HxCDF	100	105		pg/g		105	67 - 140	0.94	38
2,3,4,6,7,8-HxCDF	100	104		pg/g		104	71 - 137	0.59	35
1,2,3,7,8,9-HxCDF	100	103		pg/g		103	72 - 134	4.5	36
1,2,3,4,6,7,8-HpCDF	100	112		pg/g		112	71 - 134	1.6	33
1,2,3,4,7,8,9-HpCDF	100	111		pg/g		111	68 - 129	0.77	35
OCDF	200	204		pg/g		102	63 - 141	0.15	45

Internal Standard	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C-2,3,7,8-TCDD	*73*		*40 - 135*
13C-1,2,3,7,8-PeCDD	*69*		*40 - 135*
13C-1,2,3,6,7,8-HxCDD	*78*		*40 - 135*

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290) (Continued)

Lab Sample ID: G2G230000104L
Matrix: Solid
Analysis Batch: 2205104

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 2205104_P

Internal Standard	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C-1,2,3,4,6,7,8-HpCDD	*86*		*40 - 135*
13C-OCDD	*89*		*40 - 135*
13C-2,3,7,8-TCDF	*72*		*40 - 135*
13C-1,2,3,7,8-PeCDF	*70*		*40 - 135*
13C-1,2,3,4,7,8-HxCDF	*79*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDF	*82*		*40 - 135*

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-40244/1-A ^20
Matrix: Solid
Analysis Batch: 40546

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40244

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.0629	J	0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Arsenic	ND		0.50	0.45	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Barium	ND		0.50	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Cadmium	ND		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Chromium	ND		0.99	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Cobalt	ND		0.50	0.050	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Copper	ND		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Lead	ND		0.50	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Molybdenum	ND		0.99	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Nickel	ND		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Selenium	ND		0.99	0.25	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Thallium	ND		0.50	0.099	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Vanadium	ND		0.99	0.40	mg/Kg		07/22/12 18:43	07/23/12 20:24	20
Antimony	ND		0.99	0.15	mg/Kg		07/22/12 18:43	07/23/12 20:24	20

Lab Sample ID: MB 440-40244/1-A ^20
Matrix: Solid
Analysis Batch: 40650

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40244

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	ND		0.30	0.050	mg/Kg		07/22/12 18:43	07/24/12 12:04	20
Zinc	ND		9.9	2.0	mg/Kg		07/22/12 18:43	07/24/12 12:04	20

Lab Sample ID: LCS 440-40244/2-A ^20
Matrix: Solid
Analysis Batch: 40546

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40244

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	25.1	23.1		mg/Kg		92	80 - 120
Arsenic	50.3	44.5		mg/Kg		89	80 - 120
Barium	50.3	47.5		mg/Kg		95	80 - 120
Cadmium	50.3	45.3		mg/Kg		90	80 - 120
Chromium	50.3	46.4		mg/Kg		92	80 - 120
Cobalt	50.3	46.4		mg/Kg		92	80 - 120
Copper	50.3	47.8		mg/Kg		95	80 - 120
Lead	50.3	46.8		mg/Kg		93	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 440-40244/2-A ^20
Matrix: Solid
Analysis Batch: 40546

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40244

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Molybdenum	50.3	44.6		mg/Kg		89	80 - 120
Nickel	50.3	45.5		mg/Kg		91	80 - 120
Selenium	50.3	43.3		mg/Kg		86	80 - 120
Thallium	50.3	46.6		mg/Kg		93	80 - 120
Vanadium	50.3	46.3		mg/Kg		92	80 - 120
Antimony	50.3	45.9		mg/Kg		91	80 - 120

Lab Sample ID: LCS 440-40244/2-A ^20
Matrix: Solid
Analysis Batch: 40650

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40244

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	50.3	42.0		mg/Kg		84	80 - 120
Zinc	50.3	44.0		mg/Kg		88	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-39090/1-A
Matrix: Solid
Analysis Batch: 39564

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 39090

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/17/12 18:05	07/18/12 14:09	1

Lab Sample ID: LCS 440-39090/2-A
Matrix: Solid
Analysis Batch: 39564

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 39090

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.832		mg/Kg		104	80 - 120

Specialty Organics

Analysis Batch: 2205104

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total	Solid	8290	
440-17303-2	S2-W2comp-071112	Total	Solid	8290	
440-17303-3	S3-W3comp-071112	Total	Solid	8290	
G2G230000104B	Method Blank	Total	Solid	8290	
G2G230000104C	Lab Control Sample	Total	Solid	8290	
G2G230000104L	Lab Control Sample Dup	Total	Solid	8290	

Prep Batch: 2205104_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total	Solid	8290	
440-17303-2	S2-W2comp-071112	Total	Solid	8290	
440-17303-3	S3-W3comp-071112	Total	Solid	8290	
G2G230000104B	Method Blank	Total	Solid	8290	
G2G230000104C	Lab Control Sample	Total	Solid	8290	
G2G230000104L	Lab Control Sample Dup	Total	Solid	8290	

Metals

Prep Batch: 39090

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	7471A	
440-17303-2	S2-W2comp-071112	Total/NA	Solid	7471A	
440-17303-3	S3-W3comp-071112	Total/NA	Solid	7471A	
LCS 440-39090/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-39090/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 39564

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	7471A	39090
440-17303-2	S2-W2comp-071112	Total/NA	Solid	7471A	39090
440-17303-3	S3-W3comp-071112	Total/NA	Solid	7471A	39090
LCS 440-39090/2-A	Lab Control Sample	Total/NA	Solid	7471A	39090
MB 440-39090/1-A	Method Blank	Total/NA	Solid	7471A	39090

Prep Batch: 40244

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	3050B	
440-17303-2	S2-W2comp-071112	Total/NA	Solid	3050B	
440-17303-3	S3-W3comp-071112	Total/NA	Solid	3050B	
LCS 440-40244/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-40244/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 40546

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	6020	40244
440-17303-2	S2-W2comp-071112	Total/NA	Solid	6020	40244
440-17303-3	S3-W3comp-071112	Total/NA	Solid	6020	40244
LCS 440-40244/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	40244
MB 440-40244/1-A ^20	Method Blank	Total/NA	Solid	6020	40244

Metals (Continued)

Analysis Batch: 40650

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	6020	40244
440-17303-1	SI-W1comp-071112	Total/NA	Solid	6020	40244
440-17303-2	S2-W2comp-071112	Total/NA	Solid	6020	40244
440-17303-2	S2-W2comp-071112	Total/NA	Solid	6020	40244
440-17303-3	S3-W3comp-071112	Total/NA	Solid	6020	40244
440-17303-3	S3-W3comp-071112	Total/NA	Solid	6020	40244
LCS 440-40244/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	40244
MB 440-40244/1-A ^20	Method Blank	Total/NA	Solid	6020	40244

Analysis Batch: 40735

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17303-1	SI-W1comp-071112	Total/NA	Solid	6020	40244
440-17303-2	S2-W2comp-071112	Total/NA	Solid	6020	40244

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17303-1

Qualifiers

DIOXIN

Qualifier	Qualifier Description
CON	Confirmation analysis.
J	Estimated result. Result is less than the reporting limit.
Q	Estimated maximum possible concentration (EMPC).

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17303-1

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-12
USDA	Federal		P330-09-00080	06-06-14

Laboratory: TestAmerica West Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-14
Alaska (UST)	State Program	10	UST-055	12-18-12
Arizona	State Program	9	AZ0708	08-11-13
Arkansas DEQ	State Program	6	88-0691	06-17-13
California	NELAC	9	1119CA	01-31-13
Colorado	State Program	8	N/A	08-31-12
Connecticut	State Program	1	PH-0691	06-30-13
Florida	NELAC	4	E87570	06-30-13
Georgia	State Program	4	960	06-30-12
Guam	State Program	9	N/A	08-31-12
Hawaii	State Program	9	N/A	01-31-13
Illinois	NELAC	5	200060	03-17-13
Kansas	NELAC	7	E-10375	10-31-12
Louisiana	NELAC	6	30612	06-30-13
Michigan	State Program	5	9947	01-31-13
Nevada	State Program	9	CA44	09-30-12
New Jersey	NELAC	2	CA005	06-30-13
New Mexico	State Program	6	N/A	06-30-12
New York	NELAC	2	11666	04-01-13
Northern Mariana Islands	State Program	9	MP0007	01-31-13
Oregon	NELAC	10	CA200005	03-28-13
Pennsylvania	NELAC	3	68-01272	03-31-13
South Carolina	State Program	4	87014	06-30-13
Texas	NELAC	6	T104704399-08-TX	05-31-13
US Fish & Wildlife	Federal		LE148388-0	02-28-13
USDA	Federal		P330-11-00436	12-30-14
Utah	NELAC	8	QUAN1	01-31-13
Washington	State Program	10	C581	05-05-13
West Virginia	State Program	3	9930C	12-31-12
West Virginia DEP	State Program	3	334	07-31-12
Wisconsin	State Program	5	998204680	08-31-12
Wyoming	State Program	8	8TMS-Q	01-31-13

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: July 23, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12071708-001/003
Job No.: 440-17303-1
Sample ID.: 440-17303-1/3

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled:	07/11/12
Date Received:	07/17/12
Date Tested:	07/19/12 to 07/23/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-17303-1	PASS (LC50 > 750 mg/l)
440-17303-2	PASS (LC50 > 750 mg/l)
440-17303-3	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12071708-001

Client/ID: TA 440-17303-B-1

TEST SUMMARY

Species: ***Pimephales promelas.***
Fish weight (gm): av: 0.62; min: 0.56; max: 0.67.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: Thomas Fish.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	7-19-12 1030			7-20-12 1030				7-21-12 1030				7-22-12 1030				7-23-12 1030			
Analyst:	Z			Z				Z				Z				Jm			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.1	8.0	20.6	8.6	8.0	0	20.4	8.7	8.0	0	20.6	8.5	8.0	0	20.6	8.3	7.7	0
Control B	20.4	8.3	8.1	20.4	8.5	7.9	0	20.6	8.7	7.9	0	20.5	8.6	7.9	0	20.5	8.0	7.8	0
400 mg/l A	20.7	8.4	8.9	20.2	8.7	8.2	0	20.4	8.7	8.1	0	20.6	8.6	8.1	0	20.6	8.5	8.0	0
400 mg/l B	20.7	8.7	9.2	20.2	8.7	8.3	0	20.4	8.6	8.1	0	20.7	8.5	8.1	0	20.4	8.2	8.0	0
750 mg/l A	20.6	8.7	9.5	20.2	8.5	8.4	0	20.4	8.6	8.2	0	20.7	8.4	7.9	0	20.3	8.5	8.1	0
750 mg/l B	20.7	8.7	9.5	20.2	8.6	9.0	0	20.4	8.7	8.4	0	20.7	8.4	7.9	0	20.3	8.6	8.2	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	32 mg/l $CaCO_3$	82 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	43 mg/l $CaCO_3$	61 mg/l $CaCO_3$	92 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12071708-002

Client/ID: TA 440-17303-B-2

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.62 ; min: 0.56 ; max: 0.67 .
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: Thomas Fish.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	7-19-12 1030			7-20-12 1030				7-21-12 1030				7-22-12 1030				7-23-12 1030			
Analyst:	Z			Z				Z				Z							
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.1	8.0	20.6	8.6	8.0	0	20.4	8.7	8.0	0	20.6	8.5	8.0	0	20.6	8.3	7.7	0
Control B	20.4	8.3	8.1	20.4	8.5	7.9	0	20.6	8.7	7.9	0	20.5	6.6	7.9	0	20.5	8.0	7.8	0
400 mg/l A	20.7	8.6	9.1	20.3	8.8	8.8	0	20.4	8.7	8.4	0	20.4	8.5	8.0	0	20.5	8.4	8.1	0
400 mg/l B	20.1	8.4	9.0	20.3	8.8	8.7	0	20.4	8.6	8.3	0	20.5	6.6	8.2	0	20.4	8.1	8.1	0
750 mg/l A	20.6	8.8	9.0	20.2	8.7	8.7	0	20.3	8.6	8.3	0	20.6	6.7	8.3	0	20.3	7.6	8.0	0
750 mg/l B	20.5	8.7	9.0	20.2	8.4	8.7	0	20.4	8.5	8.2	0	20.7	8.7	8.4	0	20.2	7.5	8.0	0

Comments: Extraction method: Mechanical shaking X .
None (aqueous solution) — .
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	33 mg/l $CaCO_3$	52 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	43 mg/l $CaCO_3$	44 mg/l $CaCO_3$	76 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12071708-003

Client/ID: TA 440-17303-B-3

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.62; min: 0.56; max: 0.67.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: Thomas Fish.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	7-19-12 1030			7-20-12 1030				7-21-12 1030				7-22-12 1030				7-23-12 1030			
Analyst:																			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.1	8.0	20.6	8.6	8.0	0	20.4	8.7	8.0	0	20.6	8.5	8.0	0	20.6	8.3	7.7	0
Control B	20.4	8.3	8.1	20.4	8.5	7.9	0	20.6	8.7	7.9	0	20.5	8.6	7.9	0	20.5	8.0	7.8	0
400 mg/l A	20.6	8.7	8.8	20.4	8.8	8.4	0	20.4	8.7	8.3	0	20.4	8.7	7.7	0	20.5	8.5	8.1	0
400 mg/l B	20.6	8.7	8.8	20.3	8.4	8.4	0	20.3	8.7	8.2	0	20.5	8.6	7.9	0	20.9	8.4	8.1	0
750 mg/l A	20.5	8.7	8.7	20.3	8.5	8.4	0	20.4	8.6	8.2	0	20.6	8.5	8.1	0	20.3	8.3	8.1	0
750 mg/l B	20.5	8.7	9.0	20.2	8.5	8.4	0	20.3	8.0	8.1	0	20.7	8.5	8.1	0	20.3	8.0	8.0	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	33 mg/l $CaCO_3$	56 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	43 mg/l $CaCO_3$	54 mg/l $CaCO_3$	71 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-8469.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories				Job #: 440-17303-1
Address: 4350 Transport #107, ,	Due Date Requested: 7/24/2012			
City: Ventura	TAT Requested (days):			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Ash	Project #: 44006380			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)		SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
SI-W1comp-071112 (440-17303-1)	7/11/12	14:05 Pacific		Solid			X		
S2-W2comp-071112 (440-17303-2)	7/11/12	14:15 Pacific		Solid			X		
S3-W3comp-071112 (440-17303-3)	7/11/12	14:25 Pacific		Solid			X		

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	7-17-12 9:00		[signature]	7-17-12 9:08	
[signature]	7-17-12 12:15		[signature]	7-17-12 12:15	ATL

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 0.9

8/7/2012

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 7-12-2012	COC No: 1
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier:	____ of ____ COCs
Address	Analysis Turnaround Time			Job No. #440-17303
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below ______			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S1-W1comp-071112	7/11/2012	1405	Glass Jar	solid	3		X	X	X	
S2-W2comp-071112	7/11/2012	1415	Glass Jar	solid	3		X	X	X	
S3-W3comp-071112	7/11/2012	1425	Glass Jar	solid	3		X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☑ *Disposal By Lab* ☐ *Archive For ______ Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by: [signature]	Company: JT3	Date/Time: 7-12-12 15:15	Received by: [signature]	Company: JT3	Date/Time: 7-12-12 1520
Relinquished by: [signature]	Company: JT3	Date/Time: 7-12-12 1525	Received by: Vu Bama	Company: TAI RT	Date/Time: 7/13/12 9:45
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-17303-1

Login Number: 17303
List Number: 1
Creator: Avila, Stephanie

List Source: TestAmerica Irvine

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-17977-1
Client Project/Site: Ash

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
8/8/2012 10:56:19 AM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

LINKS
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Have a Question? Ask The Expert
Visit us at: www.testamericainc.com

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Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17977-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-17977-1	S4-W4comp-071912	Solid	07/19/12 14:30	07/20/12 09:50

Job ID: 440-17977-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-17977-1

Comments
No additional comments.

Receipt
The sample was received on 7/20/2012 9:50 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.9º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 41229 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-41229 were outside control limits for Tl. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

Subcontract non-Sister
No analytical or quality issues were noted.

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: S4-W4comp-071912
Date Collected: 07/19/12 14:30
Date Received: 07/20/12 09:50

Lab Sample ID: 440-17977-1
Matrix: Solid

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	88.0		4.98	2.02	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total TCDD	1730		4.98	2.02	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,7,8-PeCDD	228		24.9	2.42	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total PeCDD	2710		24.9	2.42	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,4,7,8-HxCDD	219		24.9	4.04	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,6,7,8-HxCDD	236		24.9	2.92	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,7,8,9-HxCDD	269		24.9	2.84	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total HxCDD	3460		24.9	3.18	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,4,6,7,8-HpCDD	2290		24.9	6.44	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total HpCDD	4600		24.9	6.44	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
OCDD	9560	B	49.8	9.81	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
2,3,7,8-TCDF	1350	CON	4.98	1.90	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total TCDF	30000		4.98	4.72	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,7,8-PeCDF	1230		24.9	4.02	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
2,3,4,7,8-PeCDF	2030		24.9	4.26	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total PeCDF	24400		24.9	4.14	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,4,7,8-HxCDF	2770		24.9	13.0	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,6,7,8-HxCDF	1350		24.9	9.59	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
2,3,4,6,7,8-HxCDF	2230		24.9	11.1	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,7,8,9-HxCDF	58.1		24.9	13.1	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total HxCDF	19100		24.9	11.5	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,4,6,7,8-HpCDF	12000	E	24.9	3.43	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
1,2,3,4,7,8,9-HpCDF	695		24.9	4.41	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
Total HpCDF	17200		24.9	3.86	pg/g		07/31/12 13:30	08/03/12 09:28	4.97
OCDF	7520		49.8	5.76	pg/g		07/31/12 13:30	08/03/12 09:28	4.97

Internal Standard	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*70*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,7,8-PeCDD	*59*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,6,7,8-HxCDD	*72*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,4,6,7,8-HpCDD	*76*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-OCDD	*63*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-2,3,7,8-TCDF	*69*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,7,8-PeCDF	*69*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,4,7,8-HxCDF	*83*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*
13C-1,2,3,4,6,7,8-HpCDF	*76*		*40 - 135*	*07/31/12 13:30*	*08/03/12 09:28*	*4.97*

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	8.9		0.49	0.049	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Arsenic	1.0		0.49	0.44	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Barium	170		0.49	0.15	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Beryllium	0.079	J	0.29	0.049	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Cadmium	8.7		0.49	0.049	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Chromium	60		0.98	0.39	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Cobalt	2.2		0.49	0.049	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Copper	2000		0.98	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Lead	160		49	9.8	mg/Kg		07/26/12 15:21	07/30/12 14:37	2000
Molybdenum	7.0		0.98	0.098	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Nickel	86		0.98	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Selenium	ND		0.98	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:31	20

Client Sample ID: S4-W4comp-071912
Date Collected: 07/19/12 14:30
Date Received: 07/20/12 09:50

Lab Sample ID: 440-17977-1
Matrix: Solid

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	ND		49	9.8	mg/Kg		07/26/12 15:21	07/30/12 14:37	2000
Vanadium	**3.8**		0.98	0.39	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Zinc	**1200**		9.8	2.0	mg/Kg		07/26/12 15:21	07/27/12 12:31	20
Antimony	**47**		0.98	0.15	mg/Kg		07/26/12 15:21	07/27/12 12:31	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/24/12 20:20	07/25/12 13:28	1

Lab Chronicle

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17977-1

Client Sample ID: S4-W4comp-071912
Date Collected: 07/19/12 14:30
Date Received: 07/20/12 09:50

Lab Sample ID: 440-17977-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	8290			2.01 g	20 uL	2213040_P	07/31/12 13:30	CC	TAL WSC
Total	Analysis	8290		4.97			2213040	08/03/12 09:28	GSV	TAL WSC
Total/NA	Prep	7471A			0.51 g	50 mL	40712	07/24/12 20:20	SN	TAL IRV
Total/NA	Analysis	7471A		1			40962	07/25/12 13:28	DB	TAL IRV
Total/NA	Prep	3050B			2.04 g	50 mL	41229	07/26/12 15:21	MP	TAL IRV
Total/NA	Analysis	6020		20			41452	07/27/12 12:31	RC	TAL IRV
Total/NA	Analysis	6020		2000			41831	07/30/12 14:37	NH	TAL IRV

Laboratory References:

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL WSC = TestAmerica West Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Lab Sample ID: G2G310000040B
Matrix: Solid
Analysis Batch: 2213040

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 2213040_P

Analyte	MB Result	MB Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	ND		1.00	0.268	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total TCDD	ND		1.00	0.268	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,7,8-PeCDD	ND		5.00	0.538	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total PeCDD	ND		5.00	0.538	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,4,7,8-HxCDD	ND		5.00	0.398	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,6,7,8-HxCDD	ND		5.00	0.328	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,7,8,9-HxCDD	ND		5.00	0.296	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total HxCDD	ND		5.00	0.398	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,4,6,7,8-HpCDD	ND		5.00	1.01	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total HpCDD	ND		5.00	1.01	pg/g		07/31/12 13:30	08/05/12 10:33	1
OCDD	3.93	J	10.0	0.900	pg/g		07/31/12 13:30	08/05/12 10:33	1
2,3,7,8-TCDF	ND		1.00	0.340	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total TCDF	ND		1.00	0.340	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,7,8-PeCDF	ND		5.00	0.551	pg/g		07/31/12 13:30	08/05/12 10:33	1
2,3,4,7,8-PeCDF	ND		5.00	0.572	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total PeCDF	ND		5.00	0.572	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,4,7,8-HxCDF	ND		5.00	0.352	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,6,7,8-HxCDF	ND		5.00	0.291	pg/g		07/31/12 13:30	08/05/12 10:33	1
2,3,4,6,7,8-HxCDF	ND		5.00	0.323	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,7,8,9-HxCDF	ND		5.00	0.351	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total HxCDF	ND		5.00	0.351	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,4,6,7,8-HpCDF	ND		5.00	0.398	pg/g		07/31/12 13:30	08/05/12 10:33	1
1,2,3,4,7,8,9-HpCDF	ND		5.00	0.471	pg/g		07/31/12 13:30	08/05/12 10:33	1
Total HpCDF	ND		5.00	0.471	pg/g		07/31/12 13:30	08/05/12 10:33	1
OCDF	ND		10.0	0.584	pg/g		07/31/12 13:30	08/05/12 10:33	1

Internal Standard	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*51*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,7,8-PeCDD	*44*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,6,7,8-HxCDD	*58*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,4,6,7,8-HpCDD	*51*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-OCDD	*50*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-2,3,7,8-TCDF	*49*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,7,8-PeCDF	*44*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,4,7,8-HxCDF	*57*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*
13C-1,2,3,4,6,7,8-HpCDF	*54*		*40 - 135*	*07/31/12 13:30*	*08/05/12 10:33*	*1*

Lab Sample ID: G2G310000040C
Matrix: Solid
Analysis Batch: 2213040

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2213040_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDD	20.0	21.0		pg/g		105	60 - 138
1,2,3,7,8-PeCDD	100	116		pg/g		116	70 - 122
1,2,3,4,7,8-HxCDD	100	90.3		pg/g		90	60 - 138
1,2,3,6,7,8-HxCDD	100	111		pg/g		111	68 - 136
1,2,3,7,8,9-HxCDD	100	103		pg/g		103	68 - 138
1,2,3,4,6,7,8-HpCDD	100	111		pg/g		111	71 - 128
OCDD	200	237		pg/g		119	70 - 128

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290) (Continued)

Lab Sample ID: G2G310000040C
Matrix: Solid
Analysis Batch: 2213040

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2213040_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDF	20.0	21.1		pg/g		105	56 - 158
1,2,3,7,8-PeCDF	100	117		pg/g		117	69 - 134
2,3,4,7,8-PeCDF	100	114		pg/g		114	70 - 131
1,2,3,4,7,8-HxCDF	100	115		pg/g		115	74 - 128
1,2,3,6,7,8-HxCDF	100	124		pg/g		124	67 - 140
2,3,4,6,7,8-HxCDF	100	119		pg/g		119	71 - 137
1,2,3,7,8,9-HxCDF	100	113		pg/g		113	72 - 134
1,2,3,4,6,7,8-HpCDF	100	113		pg/g		113	71 - 134
1,2,3,4,7,8,9-HpCDF	100	110		pg/g		110	68 - 129
OCDF	200	233		pg/g		117	63 - 141

Internal Standard	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C-2,3,7,8-TCDD	*60*		*40 - 135*
13C-1,2,3,7,8-PeCDD	*56*		*40 - 135*
13C-1,2,3,6,7,8-HxCDD	*70*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDD	*66*		*40 - 135*
13C-OCDD	*65*		*40 - 135*
13C-2,3,7,8-TCDF	*58*		*40 - 135*
13C-1,2,3,7,8-PeCDF	*56*		*40 - 135*
13C-1,2,3,4,7,8-HxCDF	*61*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDF	*66*		*40 - 135*

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-41229/1-A ^20
Matrix: Solid
Analysis Batch: 41452

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 41229

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.50	0.050	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Arsenic	ND		0.50	0.45	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Barium	ND		0.50	0.15	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Beryllium	ND		0.30	0.050	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Cadmium	ND		0.50	0.050	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Chromium	ND		1.0	0.40	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Cobalt	ND		0.50	0.050	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Copper	ND		1.0	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Copper	ND		1.0	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Molybdenum	ND		1.0	0.10	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Molybdenum	ND		1.0	0.10	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Nickel	ND		1.0	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Selenium	ND		1.0	0.25	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Vanadium	ND		1.0	0.40	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Zinc	ND		10	2.0	mg/Kg		07/26/12 15:21	07/27/12 12:16	20
Antimony	ND		1.0	0.15	mg/Kg		07/26/12 15:21	07/27/12 12:16	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 440-41229/1-A ^20
Matrix: Solid
Analysis Batch: 41831

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 41229

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		0.50	0.10	mg/Kg		07/26/12 15:21	07/30/12 14:17	20
Thallium	ND		0.50	0.10	mg/Kg		07/26/12 15:21	07/30/12 14:17	20

Lab Sample ID: LCS 440-41229/2-A ^20
Matrix: Solid
Analysis Batch: 41452

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 41229

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	25.5	23.7		mg/Kg		93	80 - 120
Arsenic	51.0	48.6		mg/Kg		95	80 - 120
Barium	51.0	46.7		mg/Kg		92	80 - 120
Beryllium	51.0	48.7		mg/Kg		95	80 - 120
Cadmium	51.0	46.7		mg/Kg		92	80 - 120
Chromium	51.0	47.9		mg/Kg		94	80 - 120
Cobalt	51.0	47.5		mg/Kg		93	80 - 120
Copper	51.0	48.2		mg/Kg		94	80 - 120
Copper	51.0	46.6		mg/Kg		91	80 - 120
Molybdenum	51.0	46.3		mg/Kg		91	80 - 120
Molybdenum	51.0	47.3		mg/Kg		93	80 - 120
Nickel	51.0	45.7		mg/Kg		90	80 - 120
Selenium	51.0	46.8		mg/Kg		92	80 - 120
Vanadium	51.0	48.8		mg/Kg		96	80 - 120
Zinc	51.0	47.1		mg/Kg		92	80 - 120
Antimony	51.0	48.5		mg/Kg		95	80 - 120

Lab Sample ID: LCS 440-41229/2-A ^20
Matrix: Solid
Analysis Batch: 41831

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 41229

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	51.0	49.0		mg/Kg		96	80 - 120
Thallium	51.0	48.2		mg/Kg		94	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-40712/1-A
Matrix: Solid
Analysis Batch: 40962

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 40712

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		07/24/12 20:20	07/25/12 12:55	1

Lab Sample ID: LCS 440-40712/2-A
Matrix: Solid
Analysis Batch: 40962

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 40712

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.812		mg/Kg		102	80 - 120

Specialty Organics

Analysis Batch: 2213040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total	Solid	8290	
G2G310000040B	Method Blank	Total	Solid	8290	
G2G310000040C	Lab Control Sample	Total	Solid	8290	

Prep Batch: 2213040_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total	Solid	8290	
G2G310000040B	Method Blank	Total	Solid	8290	
G2G310000040C	Lab Control Sample	Total	Solid	8290	

Metals

Prep Batch: 40712

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total/NA	Solid	7471A	
LCS 440-40712/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-40712/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 40962

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total/NA	Solid	7471A	40712
LCS 440-40712/2-A	Lab Control Sample	Total/NA	Solid	7471A	40712
MB 440-40712/1-A	Method Blank	Total/NA	Solid	7471A	40712

Prep Batch: 41229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total/NA	Solid	3050B	
LCS 440-41229/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-41229/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 41452

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total/NA	Solid	6020	41229
LCS 440-41229/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	41229
MB 440-41229/1-A ^20	Method Blank	Total/NA	Solid	6020	41229

Analysis Batch: 41831

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-17977-1	S4-W4comp-071912	Total/NA	Solid	6020	41229
LCS 440-41229/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	41229
MB 440-41229/1-A ^20	Method Blank	Total/NA	Solid	6020	41229

Definitions/Glossary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-17977-1

Qualifiers

DIOXIN

Qualifier	Qualifier Description
CON	Confirmation analysis.
E	Estimated result. Result concentration exceeds the calibration range.
B	Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J	Estimated result. Result is less than the reporting limit.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-12
USDA	Federal		P330-09-00080	06-06-14

Laboratory: TestAmerica West Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-14
Alaska (UST)	State Program	10	UST-055	12-18-12
Arizona	State Program	9	AZ0708	08-11-13
Arkansas DEQ	State Program	6	88-0691	06-17-13
California	NELAC	9	1119CA	01-31-13
Colorado	State Program	8	N/A	08-31-12
Connecticut	State Program	1	PH-0691	06-30-13
Florida	NELAC	4	E87570	06-30-13
Georgia	State Program	4	960	06-30-12
Guam	State Program	9	N/A	08-31-12
Hawaii	State Program	9	N/A	01-31-13
Illinois	NELAC	5	200060	03-17-13
Kansas	NELAC	7	E-10375	10-31-12
Louisiana	NELAC	6	30612	06-30-13
Michigan	State Program	5	9947	01-31-13
Nevada	State Program	9	CA44	09-30-12
New Jersey	NELAC	2	CA005	06-30-13
New Mexico	State Program	6	N/A	06-30-12
New York	NELAC	2	11666	04-01-13
Northern Mariana Islands	State Program	9	MP0007	01-31-13
Oregon	NELAC	10	CA200005	03-28-13
Pennsylvania	NELAC	3	68-01272	03-31-13
South Carolina	State Program	4	87014	06-30-13
Texas	NELAC	6	T104704399-08-TX	05-31-13
US Fish & Wildlife	Federal		LE148388-0	02-28-13
USDA	Federal		P330-11-00436	12-30-14
Utah	NELAC	8	QUAN1	01-31-13
Washington	State Program	10	C581	05-05-13
West Virginia	State Program	3	9930C	12-31-12
West Virginia DEP	State Program	3	334	07-31-12
Wisconsin	State Program	5	998204680	08-31-12
Wyoming	State Program	8	8TMS-Q	01-31-13

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: July 30, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12072404-001
Job No.: 440-17977-1
Sample ID.: 440-17977-1

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled: 07/19/12
Date Received: 07/24/12
Date Tested: 07/25/12 to 07/29/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-17977-1	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A120724 04 - 001

Client/ID: TA 440-17977-B-1
S4-W4comp-071912

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.42; min: 0.38; max: 0.49.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: Thomas Fish.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	7-25-12 1130			7-26-12 1100				7-27-12 1030				7-28-12 1030				7-29-12 1020			
Analyst:	Z.Y.			[illegible]				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.0	8.8	8.1	20.6	8.7	8.2	0	20.4	8.3	8.1	0	20.6	8.3	8.2	0	20.4	8.4	8.1	0
Control B	20.0	8.9	8.1	20.6	8.4	8.2	0	20.4	8.4	8.1	0	20.6	8.5	8.1	0	20.3	8.3	8.0	0
400 mg/l A	20.3	8.9	8.6	20.7	8.8	8.2	0	20.6	8.5	8.0	0	20.7	8.2	8.0	0	20.6	8.3	8.1	0
400 mg/l B	20.1	8.9	8.8	20.7	8.8	8.3	0	20.6	8.6	8.1	0	20.7	8.7	8.1	0	20.5	8.4	8.0	0
750 mg/l A	20.1	8.9	9.2	20.6	8.7	8.3	0	20.6	8.7	8.1	0	20.7	8.8	8.1	0	20.4	8.5	8.0	0
750 mg/l B	20.0	8.9	9.0	20.5	8.6	8.4	0	20.5	8.7	8.2	0	20.6	8.7	8.2	0	20.5	8.6	8.0	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	37 mg/l $CaCO_3$	52 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	55 mg/l $CaCO_3$	60 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

1 2 3 4 5 6 7 8 9 10 11 12 13

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-8702.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories		Analysis Requested		Job #: 440-17977-1
Address: 4350 Transport #107, ,	Due Date Requested: 7/31/2012			Preservation Codes:
City: Ventura	TAT Requested (days):			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - ice, J - DI Water, K - EDTA, L - EDA
State, Zip: CA, 93003				M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Phone:	PO #:			
Email:	WO #:			
Project Name: Ash	Project #: 44006380			
Site:	SSOW#:			Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)		SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
S4-W4comp-071912 (440-17977-1)	7/19/12	14:30 Pacific		Solid			X	1	

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ______ Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 7-24-12 9:00	Company	Received by: [signature]	Date/Time: 7-24-12 9:00	Company
Relinquished by: [signature]	Date/Time: 7-24-12 12:40	Company	Received by: [signature]	Date/Time: 7-24-12 12:40	Company ATL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 2.6°

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

440-17977

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Chain of Custody Record

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 7-19-2012	COC No: 2
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier:	____ of ____ COCs
Address	**Analysis Turnaround Time**			Job No.
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below ______			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S4-W4comp-071912	7/19/2012	1430	Glass Jar	solid	3		X	X	X	Please use sample ID from the COC.

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☑ *Disposal By Lab* ☐ *Archive For ______ Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	JTB	7-19-2012 15:10	[signature]	JTB/CH2MHILL	7/19/12 1512
[signature]	JTB/CH2MHILL	7/19/12 1814	[signature]	TAI 4.9°c 4.2°c	7/20/12 9:50

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-17977-1

Login Number: 17977

List Number: 1

Creator: Perez, Angel

List Source: TestAmerica Irvine

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	N/A	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-19124-1
Client Project/Site: Ash
Revision: 1

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
8/27/2012 10:21:30 AM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-19124-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-19124-1	S5-W5comp-072512	Solid	07/25/12 13:40	08/02/12 09:40

Case Narrative

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-19124-1

Job ID: 440-19124-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-19124-1

Comments
This is a partial report. The final report is pending dioxin data.

Receipt
The sample was received on 8/2/2012 9:40 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 22.0º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-43832 were outside control limits for Mo, Ag, Ni, Cr, and Pb. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-43832 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

Subcontract non-Sister
No analytical or quality issues were noted.

Client Sample ID: S5-W5comp-072512

Lab Sample ID: 440-19124-1

Date Collected: 07/25/12 13:40

Matrix: Solid

Date Received: 08/02/12 09:40

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Analyte	Result	Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	**0.260**	**J**	0.923	0.190	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total TCDD	**2.92**		0.923	0.190	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,7,8-PeCDD	**0.665**	**J**	4.61	0.561	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total PeCDD	**7.06**		4.61	0.561	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,4,7,8-HxCDD	**0.988**	**J**	4.61	0.305	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,6,7,8-HxCDD	**2.37**	**J**	4.61	0.251	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,7,8,9-HxCDD	**2.09**	**J**	4.61	0.226	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total HxCDD	**27.6**		4.61	0.257	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,4,6,7,8-HpCDD	**50.2**		4.61	0.365	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total HpCDD	**110**		4.61	0.365	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
OCDD	**376**		9.23	2.24	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
2,3,7,8-TCDF	**2.25**	**CON**	0.923	0.313	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total TCDF	**17.6**		0.923	0.573	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,7,8-PeCDF	**1.09**	**J**	4.61	0.879	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
2,3,4,7,8-PeCDF	**2.35**	**J**	4.61	0.911	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total PeCDF	**39.3**		4.61	0.895	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,4,7,8-HxCDF	**2.24**	**J**	4.61	0.641	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,6,7,8-HxCDF	**1.43**	**J Q**	4.61	0.529	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
2,3,4,6,7,8-HxCDF	**1.47**	**J**	4.61	0.588	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,7,8,9-HxCDF	ND		4.61	0.639	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total HxCDF	**33.0**		4.61	0.596	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,4,6,7,8-HpCDF	**14.2**		4.61	0.500	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
1,2,3,4,7,8,9-HpCDF	ND		4.61	0.592	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
Total HpCDF	**30.3**		4.61	0.542	pg/g		08/13/12 10:00	08/18/12 05:04	0.92
OCDF	**18.4**		9.23	0.671	pg/g		08/13/12 10:00	08/18/12 05:04	0.92

Internal Standard	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*77*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,7,8-PeCDD	*69*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,6,7,8-HxCDD	*81*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,4,6,7,8-HpCDD	*63*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-OCDD	*38*	***	*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-2,3,7,8-TCDF	*72*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,7,8-PeCDF	*69*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,4,7,8-HxCDF	*86*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*
13C-1,2,3,4,6,7,8-HpCDF	*66*		*40 - 135*	*08/13/12 10:00*	*08/18/12 05:04*	*0.92*

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**1.7**	**B**	0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Arsenic	**1.3**		0.50	0.45	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Barium	**980**		0.50	0.15	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Beryllium	**0.16**	**J**	0.30	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Cadmium	**4.0**		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Chromium	**28**		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Cobalt	**2.6**		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Copper	**2800**		100	25	mg/Kg		08/08/12 08:35	08/10/12 12:55	2000
Lead	**100**		0.50	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Molybdenum	**2.8**		1.0	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Nickel	**140**		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Selenium	**0.65**	**J**	1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:40	20

Client Sample ID: S5-W5comp-072512
Lab Sample ID: 440-19124-1
Date Collected: 07/25/12 13:40
Matrix: Solid
Date Received: 08/02/12 09:40

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	0.13	J	0.50	0.10	mg/Kg		08/08/12 08:35	08/10/12 12:40	20
Vanadium	6.8		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:22	20
Zinc	21000		1000	200	mg/Kg		08/08/12 08:35	08/10/12 12:55	2000
Antimony	18		1.0	0.15	mg/Kg		08/08/12 08:35	08/10/12 12:40	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/06/12 14:30	08/06/12 21:38	1

Client Sample ID: S5-W5comp-072512 Lab Sample ID: 440-19124-1

Date Collected: 07/25/12 13:40 **Matrix: Solid**

Date Received: 08/02/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total	Prep	8290			10.84 g	20 uL	2226050_P	08/13/12 10:00	TL	TAL WSC
Total	Analysis	8290		0.92			2226050	08/18/12 05:04	GSV	TAL WSC
Total/NA	Prep	7471A			0.51 g	50 mL	42968	08/06/12 14:30	SN	TAL IRV
Total/NA	Analysis	7471A		1			43461	08/06/12 21:38	DB	TAL IRV
Total/NA	Prep	3050B			2.00 g	50 mL	43832	08/08/12 08:35	DT	TAL IRV
Total/NA	Analysis	6020		20			44464	08/09/12 20:22	NH	TAL IRV
Total/NA	Analysis	6020		20			44572	08/10/12 12:40	NH	TAL IRV
Total/NA	Analysis	6020		2000			44572	08/10/12 12:55	NH	TAL IRV

Laboratory References:

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

TAL WSC = TestAmerica West Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290)

Lab Sample ID: G2H130000050B
Matrix: Solid
Analysis Batch: 2226050

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 2226050_P

Analyte	MB Result	MB Qualifier	ML	EDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-TCDD	ND		1.00	0.165	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total TCDD	ND		1.00	0.165	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,7,8-PeCDD	ND		5.00	0.396	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total PeCDD	ND		5.00	0.396	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,4,7,8-HxCDD	ND		5.00	0.299	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,6,7,8-HxCDD	ND		5.00	0.247	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,7,8,9-HxCDD	ND		5.00	0.222	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total HxCDD	ND		5.00	0.299	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,4,6,7,8-HpCDD	ND		5.00	0.277	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total HpCDD	ND		5.00	0.277	pg/g		08/13/12 10:00	08/20/12 18:22	1
OCDD	ND		10.0	0.778	pg/g		08/13/12 10:00	08/20/12 18:22	1
2,3,7,8-TCDF	ND		1.00	0.295	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total TCDF	ND		1.00	0.295	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,7,8-PeCDF	ND		5.00	0.487	pg/g		08/13/12 10:00	08/20/12 18:22	1
2,3,4,7,8-PeCDF	ND		5.00	0.505	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total PeCDF	ND		5.00	0.505	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,4,7,8-HxCDF	ND		5.00	0.251	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,6,7,8-HxCDF	ND		5.00	0.207	pg/g		08/13/12 10:00	08/20/12 18:22	1
2,3,4,6,7,8-HxCDF	ND		5.00	0.230	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,7,8,9-HxCDF	ND		5.00	0.250	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total HxCDF	ND		5.00	0.251	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,4,6,7,8-HpCDF	ND		5.00	0.190	pg/g		08/13/12 10:00	08/20/12 18:22	1
1,2,3,4,7,8,9-HpCDF	ND		5.00	0.225	pg/g		08/13/12 10:00	08/20/12 18:22	1
Total HpCDF	ND		5.00	0.225	pg/g		08/13/12 10:00	08/20/12 18:22	1
OCDF	ND		10.0	0.369	pg/g		08/13/12 10:00	08/20/12 18:22	1

Internal Standard	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C-2,3,7,8-TCDD	*79*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,7,8-PeCDD	*62*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,6,7,8-HxCDD	*89*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,4,6,7,8-HpCDD	*99*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-OCDD	*92*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-2,3,7,8-TCDF	*74*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,7,8-PeCDF	*66*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,4,7,8-HxCDF	*102*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*
13C-1,2,3,4,6,7,8-HpCDF	*97*		*40 - 135*	*08/13/12 10:00*	*08/20/12 18:22*	*1*

Lab Sample ID: G2H130000050C
Matrix: Solid
Analysis Batch: 2226050

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2226050_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDD	20.0	20.4		pg/g		102	60 - 138
1,2,3,7,8-PeCDD	100	110		pg/g		110	70 - 122
1,2,3,4,7,8-HxCDD	100	111		pg/g		111	60 - 138
1,2,3,6,7,8-HxCDD	100	113		pg/g		113	68 - 136
1,2,3,7,8,9-HxCDD	100	113		pg/g		113	68 - 138
1,2,3,4,6,7,8-HpCDD	100	109		pg/g		109	71 - 128
OCDD	200	232		pg/g		116	70 - 128

Method: 8290 - Dioxins/Furans, HRGC/HRMS (8290) (Continued)

Lab Sample ID: G2H130000050C
Matrix: Solid
Analysis Batch: 2226050

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 2226050_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2,3,7,8-TCDF	20.0	22.0		pg/g		110	56 - 158
1,2,3,7,8-PeCDF	100	113		pg/g		113	69 - 134
2,3,4,7,8-PeCDF	100	109		pg/g		109	70 - 131
1,2,3,4,7,8-HxCDF	100	106		pg/g		106	74 - 128
1,2,3,6,7,8-HxCDF	100	111		pg/g		111	67 - 140
2,3,4,6,7,8-HxCDF	100	110		pg/g		110	71 - 137
1,2,3,7,8,9-HxCDF	100	108		pg/g		108	72 - 134
1,2,3,4,6,7,8-HpCDF	100	108		pg/g		108	71 - 134
1,2,3,4,7,8,9-HpCDF	100	110		pg/g		110	68 - 129
OCDF	200	206		pg/g		103	63 - 141

Internal Standard	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C-2,3,7,8-TCDD	*66*		*40 - 135*
13C-1,2,3,7,8-PeCDD	*62*		*40 - 135*
13C-1,2,3,6,7,8-HxCDD	*70*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDD	*90*		*40 - 135*
13C-OCDD	*84*		*40 - 135*
13C-2,3,7,8-TCDF	*57*		*40 - 135*
13C-1,2,3,7,8-PeCDF	*57*		*40 - 135*
13C-1,2,3,4,7,8-HxCDF	*66*		*40 - 135*
13C-1,2,3,4,6,7,8-HpCDF	*76*		*40 - 135*

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-43832/1-A ^20
Matrix: Solid
Analysis Batch: 44464

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 43832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.0791	J	0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Arsenic	ND		0.50	0.45	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Barium	ND		0.50	0.15	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Beryllium	ND		0.30	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Cadmium	ND		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Chromium	ND		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Cobalt	ND		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Copper	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Lead	ND		0.50	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Molybdenum	ND		1.0	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Nickel	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Vanadium	ND		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Zinc	ND		10	2.0	mg/Kg		08/08/12 08:35	08/09/12 20:16	20

Lab Sample ID: MB 440-43832/1-A ^20
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 43832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:35	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 440-43832/1-A ^20 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 44572 — **Prep Batch: 43832**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Thallium	ND		0.50	0.10	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Zinc	ND		10	2.0	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Antimony	ND		1.0	0.15	mg/Kg		08/08/12 08:35	08/10/12 12:35	20

Lab Sample ID: LCS 440-43832/2-A ^20 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 44464 — **Prep Batch: 43832**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	24.8	20.1		mg/Kg		81	80 - 120
Arsenic	49.5	44.9		mg/Kg		91	80 - 120
Barium	49.5	47.9		mg/Kg		97	80 - 120
Beryllium	49.5	43.6		mg/Kg		88	80 - 120
Cadmium	49.5	44.5		mg/Kg		90	80 - 120
Chromium	49.5	46.9		mg/Kg		95	80 - 120
Cobalt	49.5	46.7		mg/Kg		94	80 - 120
Copper	49.5	47.2		mg/Kg		95	80 - 120
Lead	49.5	47.5		mg/Kg		96	80 - 120
Molybdenum	49.5	42.5		mg/Kg		86	80 - 120
Nickel	49.5	45.5		mg/Kg		92	80 - 120
Vanadium	49.5	46.8		mg/Kg		95	80 - 120
Zinc	49.5	42.9		mg/Kg		87	80 - 120

Lab Sample ID: LCS 440-43832/2-A ^20 — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 44572 — **Prep Batch: 43832**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	49.5	47.0		mg/Kg		95	80 - 120
Selenium	49.5	43.9		mg/Kg		89	80 - 120
Thallium	49.5	47.2		mg/Kg		95	80 - 120
Zinc	49.5	44.3		mg/Kg		89	80 - 120
Antimony	49.5	47.4		mg/Kg		96	80 - 120

Lab Sample ID: 440-19124-1 MS — **Client Sample ID: S5-W5comp-072512**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 44464 — **Prep Batch: 43832**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	1.7	B	25.1	19.4	F	mg/Kg		70	80 - 120
Arsenic	1.3		50.3	43.8		mg/Kg		85	80 - 120
Barium	980		50.3	965	4	mg/Kg		-33	80 - 120
Beryllium	0.16	J	50.3	41.4		mg/Kg		82	80 - 120
Cadmium	4.0		50.3	44.6		mg/Kg		81	80 - 120
Chromium	28		50.3	96.0	F	mg/Kg		135	80 - 120
Cobalt	2.6		50.3	44.1		mg/Kg		82	80 - 120
Lead	100		50.3	502	F	mg/Kg		798	80 - 120
Molybdenum	2.8		50.3	39.5	F	mg/Kg		73	80 - 120
Nickel	140		50.3	125	F	mg/Kg		-31	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 440-19124-1 MS
Matrix: Solid
Analysis Batch: 44464

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Vanadium	6.8		50.3	49.4		mg/Kg		85	80 - 120

Lab Sample ID: 440-19124-1 MS
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Selenium	0.65	J	50.3	39.7	F	mg/Kg		78	80 - 120
Thallium	0.13	J	50.3	24.5	F	mg/Kg		48	80 - 120
Antimony	18		50.3	46.2	F	mg/Kg		55	80 - 120

Lab Sample ID: 440-19124-1 MS
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	2800		50.3	9350	4	mg/Kg		13061	80 - 120
Zinc	21000		50.3	30200	4	mg/Kg		19214	80 - 120

Lab Sample ID: 440-19124-1 MSD
Matrix: Solid
Analysis Batch: 44464

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Silver	1.7	B	24.9	19.1	F	mg/Kg		70	80 - 120	2	20
Arsenic	1.3		49.8	43.9		mg/Kg		86	80 - 120	0	20
Barium	980		49.8	945	4	mg/Kg		-73	80 - 120	2	20
Beryllium	0.16	J	49.8	41.9		mg/Kg		84	80 - 120	1	20
Cadmium	4.0		49.8	44.0		mg/Kg		80	80 - 120	1	20
Chromium	28		49.8	91.5	F	mg/Kg		127	80 - 120	5	20
Cobalt	2.6		49.8	43.8		mg/Kg		83	80 - 120	1	20
Lead	100		49.8	494	F	mg/Kg		791	80 - 120	1	20
Molybdenum	2.8		49.8	39.1	F	mg/Kg		73	80 - 120	1	20
Nickel	140		49.8	130	F	mg/Kg		-22	80 - 120	4	20
Vanadium	6.8		49.8	48.0		mg/Kg		83	80 - 120	3	20

Lab Sample ID: 440-19124-1 MSD
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Selenium	0.65	J	49.8	39.6	F	mg/Kg		78	80 - 120	0	20
Thallium	0.13	J	49.8	25.2	F	mg/Kg		50	80 - 120	3	20
Antimony	18		49.8	39.1	F	mg/Kg		42	80 - 120	17	20

Lab Sample ID: 440-19124-1 MSD
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: S5-W5comp-072512
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	2800		49.8	9030	4	mg/Kg		12546	80 - 120	3	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 440-19124-1 MSD **Client Sample ID: S5-W5comp-072512**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 44572 **Prep Batch: 43832**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	21000		49.8	30100	4	mg/Kg		19107	80 - 120	0	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-42968/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 43461 **Prep Batch: 42968**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/06/12 14:30	08/06/12 20:52	1

Lab Sample ID: LCS 440-42968/2-A **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 43461 **Prep Batch: 42968**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.871		mg/Kg		109	80 - 120

Lab Sample ID: 440-19083-A-1-D MS **Client Sample ID: Matrix Spike**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 43461 **Prep Batch: 42968**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.28		0.800	0.957		mg/Kg		84	70 - 130

Lab Sample ID: 440-19083-A-1-E MSD **Client Sample ID: Matrix Spike Duplicate**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 43461 **Prep Batch: 42968**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.28		0.800	1.07		mg/Kg		98	70 - 130	11	20

1 2 3 4 5 6 7 8 9 10 11 12 13

QC Association Summary

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-19124-1

Specialty Organics

Analysis Batch: 2226050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19124-1	S5-W5comp-072512	Total	Solid	8290	
G2H130000050B	Method Blank	Total	Solid	8290	
G2H130000050C	Lab Control Sample	Total	Solid	8290	

Prep Batch: 2226050_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19124-1	S5-W5comp-072512	Total	Solid	8290	
G2H130000050B	Method Blank	Total	Solid	8290	
G2H130000050C	Lab Control Sample	Total	Solid	8290	

Metals

Prep Batch: 42968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19083-A-1-D MS	Matrix Spike	Total/NA	Solid	7471A	
440-19083-A-1-E MSD	Matrix Spike Duplicate	Total/NA	Solid	7471A	
440-19124-1	S5-W5comp-072512	Total/NA	Solid	7471A	
LCS 440-42968/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-42968/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 43461

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19083-A-1-D MS	Matrix Spike	Total/NA	Solid	7471A	42968
440-19083-A-1-E MSD	Matrix Spike Duplicate	Total/NA	Solid	7471A	42968
440-19124-1	S5-W5comp-072512	Total/NA	Solid	7471A	42968
LCS 440-42968/2-A	Lab Control Sample	Total/NA	Solid	7471A	42968
MB 440-42968/1-A	Method Blank	Total/NA	Solid	7471A	42968

Prep Batch: 43832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19124-1	S5-W5comp-072512	Total/NA	Solid	3050B	
440-19124-1 MS	S5-W5comp-072512	Total/NA	Solid	3050B	
440-19124-1 MSD	S5-W5comp-072512	Total/NA	Solid	3050B	
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 44464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19124-1	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MS	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MSD	S5-W5comp-072512	Total/NA	Solid	6020	43832
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	43832
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	6020	43832

Analysis Batch: 44572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19124-1	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MS	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MS	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MSD	S5-W5comp-072512	Total/NA	Solid	6020	43832
440-19124-1 MSD	S5-W5comp-072512	Total/NA	Solid	6020	43832

Metals (Continued)

Analysis Batch: 44572 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	43832
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	6020	43832

Client: JT3 LLC
Project/Site: Ash

TestAmerica Job ID: 440-19124-1

Qualifiers

DIOXIN

Qualifier	Qualifier Description
J	Estimated result. Result is less than the reporting limit.
CON	Confirmation analysis.
Q	Estimated maximum possible concentration (EMPC).
*	Surrogate recovery is outside stated control limits.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-12
USDA	Federal		P330-09-00080	06-06-14

Laboratory: TestAmerica West Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	01-31-14
Alaska (UST)	State Program	10	UST-055	12-18-12
Arizona	State Program	9	AZ0708	08-11-13
Arkansas DEQ	State Program	6	88-0691	06-17-13
California	NELAC	9	1119CA	01-31-13
Colorado	State Program	8	N/A	08-31-13
Connecticut	State Program	1	PH-0691	06-30-13
Florida	NELAC	4	E87570	06-30-13
Guam	State Program	9	N/A	08-31-12
Hawaii	State Program	9	N/A	01-31-13
Illinois	NELAC	5	200060	03-17-13
Kansas	NELAC	7	E-10375	10-31-12
Louisiana	NELAC	6	30612	06-30-13
Michigan	State Program	5	9947	01-31-13
Nevada	State Program	9	CA44	07-31-13
New Jersey	NELAC	2	CA005	06-30-13
New York	NELAC	2	11666	04-01-13
Northern Mariana Islands	State Program	9	MP0007	01-31-13
Oregon	NELAC	10	CA200005	03-28-13
Pennsylvania	NELAC	3	68-01272	03-31-13
South Carolina	State Program	4	87014	06-30-13
Texas	NELAC	6	T104704399-08-TX	05-31-13
US Fish & Wildlife	Federal		LE148388-0	02-28-13
USDA	Federal		P330-11-00436	12-30-14
Utah	NELAC	8	QUAN1	01-31-13
Washington	State Program	10	C581	05-05-13
West Virginia	State Program	3	9930C	12-31-12
West Virginia DEP	State Program	3	334	07-31-13
Wisconsin	State Program	5	998204680	08-31-12
Wyoming	State Program	8	8TMS-Q	01-31-13

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: August 9, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12080402-001
Job No.: 440-19124-1
Sample ID.: 440-19124-1

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled:	07/25/12
Date Received:	08/04/12
Date Tested:	08/05/12 to 08/09/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-19124-1	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1208040 2-001

Client/ID: TA 440-19124-C-7

TEST SUMMARY

Species: ***Pimephales promelas.***
Fish weight (gm): av: 0.24; min: 0.21; max: 0.30.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			**24 Hr**				**48 Hr**				**72 Hr**				**96 Hr**			
Date/Time:	8-5-12 1100			8-6-12 1100				8-7-12 1100				8-8-12 1100				8-9-12 1100			
Analyst:	[illegible]			L.T.				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.4	8.8	8.2	21.0	8.8	7.7	0	21.0	8.7	7.9	0	20.7	8.6	7.9	0	20.7	8.6	8.0	0
Control B	20.3	8.9	8.2	21.0	8.8	7.7	0	21.0	8.6	7.8	0	20.7	8.5	7.8	0	20.6	8.6	8.0	0
400 mg/l A	20.3	8.7	8.3	21.0	8.8	8.4	0	21.0	8.7	8.0	0	20.8	8.7	8.0	0	20.7	8.7	8.0	0
400 mg/l B	20.4	8.7	8.1	20.9	8.8	8.4	0	21.0	8.7	8.0	0	20.9	8.7	8.1	0	20.6	8.7	8.1	0
750 mg/l A	20.3	8.7	8.4	20.8	8.8	8.8	0	20.9	8.7	8.1	0	20.7	8.7	8.1	0	20.6	8.7	8.1	0
750 mg/l B	20.4	8.8	8.3	20.7	8.9	9.2	0	20.8	8.6	8.1	0	20.7	8.6	8.3	0	20.7	8.6	8.1	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		**HIGH CONCENTRATION**	
	Alkalinity	**Hardness**	**Alkalinity**	**Hardness**
Initial	31 mg/l $CaCO_3$	44 mg/l $CaCO_3$	32 mg/l $CaCO_3$	44 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	45 mg/l $CaCO_3$	41 mg/l $CaCO_3$	67 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-9255.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories		**Analysis Requested**		Job #: 440-19124-1
Address: 4350 Transport #107, ,	**Due Date Requested:** 8/10/2012			**Preservation Codes:**
City: Ventura	**TAT Requested (days):**			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Ash	Project #: 44006380			
Site:	SSOW#:			Other:

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
S5-W5comp-072512 (440-19124-1)	7/25/12	13:40 Pacific		Solid			X		

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Vu Bank	8/3/12 17:00	TAI	FedEx	8/3/12 17:00	
Fed Ex	8-4-12 1002	FX	[illegible]	8-4-12 1002	ATL

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.: 69619
Cooler Temperature(s) °C and Other Remarks: 0.6

Chain of Custody Record

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 7-25-2012	COC No: 3
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier:	____ of ____ COCs
Address	Analysis Turnaround Time			Job No. #440-19124
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below ____			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S5-W5comp-072512	7/25/2012	1340	Glass Jar	solid	3		X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☑ *Disposal By Lab* ☐ *Archive For ____ Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by: [signature]	Company: JT3	Date/Time: 7-25-2012 14:30	Received by: [signature]	Company: JT3/CH2MHILL	Date/Time: 7-25-12 1434
Relinquished by: [signature]	Company: JT3	Date/Time: 7-25-12 1440	Received by: V u Baul	Company: TAI RT	Date/Time: 7/26/12 940
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC | Job Number: 440-19124-1

Login Number: 19124 | **List Source: TestAmerica Irvine**

List Number: 1

Creator: Avila, Stephanie

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

1 2 3 4 5 6 7 8 9 10 11 12

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-19315-1
Client Project/Site: Waste to Energy

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
8/26/2012 9:00:51 AM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-19315-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-19315-1	S6-W6comp-080212	Solid	08/02/12 13:35	08/03/12 09:50
OL4176	S6-W6COMP-080212 (440-193	Soil		

Client Sample ID: S6-W6comp-080212

Lab Sample ID: 440-19315-1

Date Collected: 08/02/12 13:35

Matrix: Solid

Date Received: 08/03/12 09:50

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	1.6	B	0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Arsenic	0.66		0.50	0.45	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Barium	340		0.50	0.15	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Beryllium	0.17	J	0.30	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Cadmium	4.2		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Chromium	67		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Cobalt	2.2		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Copper	1800		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Lead	78		0.50	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Molybdenum	4.3		1.0	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Nickel	130		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Selenium	0.34	J	1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:50	20
Thallium	ND		0.50	0.10	mg/Kg		08/08/12 08:35	08/10/12 12:50	20
Vanadium	6.4		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Zinc	1300		10	2.0	mg/Kg		08/08/12 08:35	08/09/12 20:32	20
Antimony	40		1.0	0.15	mg/Kg		08/08/12 08:35	08/10/12 12:50	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/06/12 19:15	08/07/12 15:52	1

Client Sample ID: S6-W6COMP-080212 (440-193

Lab Sample ID: OL4176

Date Collected:

Matrix: Soil

Date Received:

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	1460		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	6500		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	526		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8-Hexa CDD	163		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8-Hexa CDF	4550	A3807	85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,6,7,8-Hexa CDD	233		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,6,7,8-Hexa CDF	1610		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8,9-Hexa CDD	253		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8,9-Hexa CDF	60.4	J	85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8-Penta CDD	268		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8-Penta CDF	1350		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,4,6,7,8-Hexa CDF	2150		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,4,7,8-Penta CDF	2300		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,7,8-Tetra CDD	130		34		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,7,8-Tetra CDF	4050		34		pg/g		08/13/12 00:00	08/18/12 00:00	1
Octa CDD	2740		170		pg/g		08/13/12 00:00	08/18/12 00:00	1
Octa CDF	2570		170		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hepta CDD	3010		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hepta CDF	9180		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hexa CDD	3580		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hexa CDF	16100		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Penta CDD	3730		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Penta CDF	26200		85		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Tetra CDD	2020		34		pg/g		08/13/12 00:00	08/18/12 00:00	1

Client Sample Results

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-19315-1

Client Sample ID: S6-W6COMP-080212 (440-193

Lab Sample ID: OL4176

Date Collected:

Matrix: Soil

Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Tetra CDF	24100		34		pg/g		08/13/12 00:00	08/18/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*90*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-1234678 HeptaCDF	*91*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-123478 HexaCDF	*86*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-123678 HexaCDD	*88*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-12378 PentaCDD	*85*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-12378 PentaCDF	*80*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-2378 TetraCDD	*89*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-2378 TetraCDF	*83*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-OCDD	*91*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*

Lab Chronicle

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-19315-1

Client Sample ID: S6-W6comp-080212
Date Collected: 08/02/12 13:35
Date Received: 08/03/12 09:50

Lab Sample ID: 440-19315-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.50 g	50 mL	43419	08/06/12 19:15	SN	TAL IRV
Total/NA	Analysis	7471A		1			43708	08/07/12 15:52	DB	TAL IRV
Total/NA	Prep	3050B			2.00 g	50 mL	43832	08/08/12 08:35	DT	TAL IRV
Total/NA	Analysis	6020		20			44464	08/09/12 20:32	NH	TAL IRV
Total/NA	Analysis	6020		20			44572	08/10/12 12:50	NH	TAL IRV

Client Sample ID: S6-W6COMP-080212 (440-193
Date Collected:
Date Received:

Lab Sample ID: OL4176
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	NA		1			2941551_P	08/13/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2941551	08/18/12 00:00	OBC	

Laboratory References:

= , , ,

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-43832/1-A ^20
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 44464
Prep Batch: 43832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.0791	J	0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Arsenic	ND		0.50	0.45	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Barium	ND		0.50	0.15	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Beryllium	ND		0.30	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Cadmium	ND		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Chromium	ND		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Cobalt	ND		0.50	0.050	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Copper	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Lead	ND		0.50	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Molybdenum	ND		1.0	0.10	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Nickel	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Vanadium	ND		1.0	0.40	mg/Kg		08/08/12 08:35	08/09/12 20:16	20
Zinc	ND		10	2.0	mg/Kg		08/08/12 08:35	08/09/12 20:16	20

Lab Sample ID: MB 440-43832/1-A ^20
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 44572
Prep Batch: 43832

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Selenium	ND		1.0	0.25	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Thallium	ND		0.50	0.10	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Zinc	ND		10	2.0	mg/Kg		08/08/12 08:35	08/10/12 12:35	20
Antimony	ND		1.0	0.15	mg/Kg		08/08/12 08:35	08/10/12 12:35	20

Lab Sample ID: LCS 440-43832/2-A ^20
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 44464
Prep Batch: 43832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	24.8	20.1		mg/Kg		81	80 - 120
Arsenic	49.5	44.9		mg/Kg		91	80 - 120
Barium	49.5	47.9		mg/Kg		97	80 - 120
Beryllium	49.5	43.6		mg/Kg		88	80 - 120
Cadmium	49.5	44.5		mg/Kg		90	80 - 120
Chromium	49.5	46.9		mg/Kg		95	80 - 120
Cobalt	49.5	46.7		mg/Kg		94	80 - 120
Copper	49.5	47.2		mg/Kg		95	80 - 120
Lead	49.5	47.5		mg/Kg		96	80 - 120
Molybdenum	49.5	42.5		mg/Kg		86	80 - 120
Nickel	49.5	45.5		mg/Kg		92	80 - 120
Vanadium	49.5	46.8		mg/Kg		95	80 - 120
Zinc	49.5	42.9		mg/Kg		87	80 - 120

Lab Sample ID: LCS 440-43832/2-A ^20
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 44572
Prep Batch: 43832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	49.5	47.0		mg/Kg		95	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 440-43832/2-A ^20
Matrix: Solid
Analysis Batch: 44572

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 43832

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Selenium	49.5	43.9		mg/Kg		89	80 - 120
Thallium	49.5	47.2		mg/Kg		95	80 - 120
Zinc	49.5	44.3		mg/Kg		89	80 - 120
Antimony	49.5	47.4		mg/Kg		96	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-43419/1-A
Matrix: Solid
Analysis Batch: 43708

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 43419

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/06/12 19:15	08/07/12 15:03	1

Lab Sample ID: LCS 440-43419/2-A
Matrix: Solid
Analysis Batch: 43708

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 43419

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.829		mg/Kg		104	80 - 120

Method: EPA 8290 mod. - EPA 8290 mod.

Lab Sample ID: 2941551-BLK
Matrix: Soil
Analysis Batch: 2941551

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2941551_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	1.19	J	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	ND	A3808	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	ND	A3808	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,6,7,8-Hexa CDD	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,6,7,8-Hexa CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8,9-Hexa CDD	0.76	J	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8-Penta CDD	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
1,2,3,7,8-Penta CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,4,6,7,8-Hexa CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,4,7,8-Penta CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,7,8-Tetra CDD	ND		10		pg/g		08/13/12 00:00	08/18/12 00:00	1
2,3,7,8-Tetra CDF	ND		10		pg/g		08/13/12 00:00	08/18/12 00:00	1
Octa CDD	ND	A3808	50		pg/g		08/13/12 00:00	08/18/12 00:00	1
Octa CDF	1.48	J	50		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hepta CDD	1.19	J	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hepta CDF	ND	A3808	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hexa CDD	0.76	J	25		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Hexa CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Penta CDD	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2941551-BLK
Matrix: Soil
Analysis Batch: 2941551

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2941551_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Penta CDF	ND		25		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Tetra CDD	ND		10		pg/g		08/13/12 00:00	08/18/12 00:00	1
Total Tetra CDF	ND		10		pg/g		08/13/12 00:00	08/18/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*83*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-1234678 HeptaCDF	*93*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-123478 HexaCDF	*80*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-123678 HexaCDD	*72*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-12378 PentaCDD	*91*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-12378 PentaCDF	*92*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-2378 TetraCDD	*81*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-2378 TetraCDF	*84*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*
C13-OCDD	*77*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*

Lab Sample ID: 2941551-LCS
Matrix: Soil
Analysis Batch: 2941551

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 2941551_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,4,6,7,8-Hepta CDD	100	110		pg/g		110	80 - 140
1,2,3,4,6,7,8-Hepta CDF	100	101		pg/g		101	80 - 140
1,2,3,4,7,8,9-Hepta CDF	100	103		pg/g		103	80 - 140
1,2,3,4,7,8-Hexa CDD	100	116		pg/g		116	80 - 140
1,2,3,4,7,8-Hexa CDF	100	108		pg/g		108	80 - 140
1,2,3,6,7,8-Hexa CDD	100	107		pg/g		107	80 - 140
1,2,3,6,7,8-Hexa CDF	100	105		pg/g		105	80 - 140
1,2,3,7,8,9-Hexa CDD	100	115		pg/g		115	80 - 140
1,2,3,7,8,9-Hexa CDF	100	111		pg/g		111	80 - 140
1,2,3,7,8-Penta CDD	100	119		pg/g		119	80 - 140
1,2,3,7,8-Penta CDF	100	115		pg/g		115	80 - 140
2,3,4,6,7,8-Hexa CDF	100	109		pg/g		109	80 - 140
2,3,4,7,8-Penta CDF	100	125		pg/g		125	80 - 140
2,3,7,8-Tetra CDD	100	107		pg/g		107	80 - 140
2,3,7,8-Tetra CDF	100	99		pg/g		99	80 - 140
Octa CDD	100	105		pg/g		105	80 - 140
Octa CDF	100	111		pg/g		111	80 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
C13-1234678 HeptaCDD	*80*		*40 - 135*
C13-1234678 HeptaCDF	*83*		*40 - 135*
C13-123478 HexaCDF	*77*		*40 - 135*
C13-123678 HexaCDD	*82*		*40 - 135*
C13-12378 PentaCDD	*92*		*40 - 135*
C13-12378 PentaCDF	*84*		*40 - 135*
C13-2378 TetraCDD	*95*		*40 - 135*
C13-2378 TetraCDF	*87*		*40 - 135*
C13-OCDD	*79*		*40 - 135*

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2944752-BLK **Client Sample ID: Method Blank**
Matrix: Soil **Prep Type: Total/NA**
Analysis Batch: 2944752 **Prep Batch: 2944752_P**

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND		3.3		pg/g		08/13/12 00:00	08/18/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-2378 TetraCDF	*100*		*40 - 135*	*08/13/12 00:00*	*08/18/12 00:00*	*1*

QC Association Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-19315-1

Metals

Prep Batch: 43419

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19315-1	S6-W6comp-080212	Total/NA	Solid	7471A	
LCS 440-43419/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-43419/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 43708

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19315-1	S6-W6comp-080212	Total/NA	Solid	7471A	43419
LCS 440-43419/2-A	Lab Control Sample	Total/NA	Solid	7471A	43419
MB 440-43419/1-A	Method Blank	Total/NA	Solid	7471A	43419

Prep Batch: 43832

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19315-1	S6-W6comp-080212	Total/NA	Solid	3050B	
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 44464

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19315-1	S6-W6comp-080212	Total/NA	Solid	6020	43832
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	43832
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	6020	43832

Analysis Batch: 44572

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-19315-1	S6-W6comp-080212	Total/NA	Solid	6020	43832
LCS 440-43832/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	43832
MB 440-43832/1-A ^20	Method Blank	Total/NA	Solid	6020	43832

Subcontract

Analysis Batch: 2941551

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2941551-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2941551_P
2941551-LCS	Lab Control Sample	Total/NA	Soil	EPA 8290 mod.	2941551_P
OL4176	S6-W6COMP-080212 (440-193	Total/NA	Soil	EPA 8290 mod.	2941551_P

Analysis Batch: 2944752

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2944752-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2944752_P

Prep Batch: 2941551_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2941551-BLK	Method Blank	Total/NA	Soil	NA	
2941551-LCS	Lab Control Sample	Total/NA	Soil	NA	
OL4176	S6-W6COMP-080212 (440-193	Total/NA	Soil	NA	

Prep Batch: 2944752_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2944752-BLK	Method Blank	Total/NA	Soil	NA	

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

Subcontract

Qualifier	Qualifier Description
A3807	EMPC / Merged Peak
J	Estimated concentration between the EDL and RDL
A3979	Results from 5x dilution
A3808	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-12
USDA	Federal		P330-09-00080	06-06-14

Success Through Science®

Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: N_A

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/08/21

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2C1408
Received: 2012/08/10, 12:05

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (8290) (1)	1	2012/08/13	2012/08/18	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	1	N/A	2012/08/18	BRL SOP-00406	EPA 8290 mod.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Total cover pages: 1

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B2C1408
Report Date: 2012/08/21

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OL4176						
Sampling Date		2012/08/02 13:35						
COC Number		N_A		TOXIC EQUIVALENCY		# of		
	Units	S6-W6COMP-080212 (440-19315-1)	EDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	RDL
2,3,7,8-Tetra CDD *	pg/g	130	1.3	1.00	130		2941551	20
1,2,3,7,8-Penta CDD	pg/g	268	1.9	1.00	268		2941551	50
1,2,3,4,7,8-Hexa CDD	pg/g	163	1.2	0.100	16.3		2941551	50
1,2,3,6,7,8-Hexa CDD	pg/g	233	1.1	0.100	23.3		2941551	50
1,2,3,7,8,9-Hexa CDD	pg/g	253	1.1	0.100	25.3		2941551	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	1460	1.2	0.0100	14.6		2941551	50
Octa CDD	pg/g	2740	2.9	0.000300	0.822		2941551	100
Total Tetra CDD	pg/g	2020	1.3				2941551	20
Total Penta CDD	pg/g	3730	1.9				2941551	50
Total Hexa CDD	pg/g	3580	1.1				2941551	50
Total Hepta CDD	pg/g	3010	1.2				2941551	50
2,3,7,8-Tetra CDF **	pg/g	4050	1.2	0.100	405		2941551	20
1,2,3,7,8-Penta CDF	pg/g	1350	1.3	0.0300	40.5		2941551	50
2,3,4,7,8-Penta CDF	pg/g	2300	1.3	0.300	690		2941551	50
1,2,3,4,7,8-Hexa CDF	pg/g	4550 (1)	1.4	0.100	455		2941551	50
1,2,3,6,7,8-Hexa CDF	pg/g	1610	1.3	0.100	161		2941551	50
2,3,4,6,7,8-Hexa CDF	pg/g	2150	1.5	0.100	215		2941551	50
1,2,3,7,8,9-Hexa CDF	pg/g	60.4 J	1.7	0.100	6.04		2941551	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	6500	1.1	0.0100	65.0		2941551	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	526	1.4	0.0100	5.26		2941551	50
Octa CDF	pg/g	2570	2.7	0.000300	0.771		2941551	100
Total Tetra CDF	pg/g	24100	1.2				2941551	20
Total Penta CDF	pg/g	26200	1.3				2941551	50
Total Hexa CDF	pg/g	16100	1.4				2941551	50
Total Hepta CDF	pg/g	9180	1.2				2941551	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	1410 (2)	6.0	0.100	141		2944752	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				2260			

EDL = Estimated Detection Limit
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / Merged Peak
(2) Results from 5x dilution

Maxxam Job #: B2C1408
Report Date: 2012/08/21

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OL4176						
Sampling Date		2012/08/02 13:35						
COC Number		N_A		TOXIC EQUIVALENCY		# of		
	Units	**S6-W6COMP-080212 (440-19315-1)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**

Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	90					2941551	
C13-1234678 HeptaCDF **	%	91					2941551	
C13-123478 HexaCDF	%	86					2941551	
C13-123678 HexaCDD	%	88					2941551	
C13-12378 PentaCDD	%	85					2941551	
C13-12378 PentaCDF	%	80					2941551	
C13-2378 TetraCDD	%	89					2941551	
C13-2378 TetraCDF	%	83					2941551	
C13-OCDD	%	91					2941551	
Confirmation C13-2378 TetraCDF	%	81					2944752	

EDL = Estimated Detection Limit
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2C1408
Report Date: 2012/08/21

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

Test Summary

Maxxam ID OL4176
Sample ID S6-W6COMP-080212 (440-19315-1)
Matrix Soil

Collected 2012/08/02
Shipped
Received 2012/08/10

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2941551	2012/08/13	2012/08/18	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	2944752	N/A	2012/08/18	Angel Guerrero

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

GENERAL COMMENTS

Sample OL4176-01: 5X Dilution

Results relate only to the items tested.

1 2 3 4 5 6 7 8 9 10 11 12

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report

Maxxam Job Number: GB2C1408

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2941551 OBC	Spiked Blank	C13-1234678 HeptaCDD	2012/08/17		80	%	40 - 135
		C13-1234678 HeptaCDF	2012/08/17		83	%	40 - 135
		C13-123478 HexaCDF	2012/08/17		77	%	40 - 135
		C13-123678 HexaCDD	2012/08/17		82	%	40 - 135
		C13-12378 PentaCDD	2012/08/17		92	%	40 - 135
		C13-12378 PentaCDF	2012/08/17		84	%	40 - 135
		C13-2378 TetraCDD	2012/08/17		95	%	40 - 135
		C13-2378 TetraCDF	2012/08/17		87	%	40 - 135
		C13-OCDD	2012/08/17		79	%	40 - 135
		2,3,7,8-Tetra CDD	2012/08/17		107	%	80 - 140
		1,2,3,7,8-Penta CDD	2012/08/17		119	%	80 - 140
		1,2,3,4,7,8-Hexa CDD	2012/08/17		116	%	80 - 140
		1,2,3,6,7,8-Hexa CDD	2012/08/17		107	%	80 - 140
		1,2,3,7,8,9-Hexa CDD	2012/08/17		115	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDD	2012/08/17		110	%	80 - 140
		Octa CDD	2012/08/17		105	%	80 - 140
		2,3,7,8-Tetra CDF	2012/08/17		99	%	80 - 140
		1,2,3,7,8-Penta CDF	2012/08/17		115	%	80 - 140
		2,3,4,7,8-Penta CDF	2012/08/17		125	%	80 - 140
		1,2,3,4,7,8-Hexa CDF	2012/08/17		108	%	80 - 140
		1,2,3,6,7,8-Hexa CDF	2012/08/17		105	%	80 - 140
		2,3,4,6,7,8-Hexa CDF	2012/08/17		109	%	80 - 140
		1,2,3,7,8,9-Hexa CDF	2012/08/17		111	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDF	2012/08/17		101	%	80 - 140
		1,2,3,4,7,8,9-Hepta CDF	2012/08/17		103	%	80 - 140
		Octa CDF	2012/08/17		111	%	80 - 140
	Method Blank	C13-1234678 HeptaCDD	2012/08/17		83	%	40 - 135
		C13-1234678 HeptaCDF	2012/08/17		93	%	40 - 135
		C13-123478 HexaCDF	2012/08/17		80	%	40 - 135
		C13-123678 HexaCDD	2012/08/17		72	%	40 - 135
		C13-12378 PentaCDD	2012/08/17		91	%	40 - 135
		C13-12378 PentaCDF	2012/08/17		92	%	40 - 135
		C13-2378 TetraCDD	2012/08/17		81	%	40 - 135
		C13-2378 TetraCDF	2012/08/17		84	%	40 - 135
		C13-OCDD	2012/08/17		77	%	40 - 135
		2,3,7,8-Tetra CDD	2012/08/17	0.52 U, EDL=0.52		pg/g	
		1,2,3,7,8-Penta CDD	2012/08/17	0.57 U, EDL=0.57		pg/g	
		1,2,3,4,7,8-Hexa CDD	2012/08/17	0.55 U, EDL=0.55		pg/g	
		1,2,3,6,7,8-Hexa CDD	2012/08/17	0.49 U, EDL=0.49		pg/g	
		1,2,3,7,8,9-Hexa CDD	2012/08/17	0.76 J, EDL=0.49		pg/g	
		1,2,3,4,6,7,8-Hepta CDD	2012/08/17	1.19 J, EDL=0.46		pg/g	
		Octa CDD	2012/08/17	1.6 U, EDL=1.6 (1)		pg/g	
		Total Tetra CDD	2012/08/17	0.52 U, EDL=0.52		pg/g	
		Total Penta CDD	2012/08/17	0.57 U, EDL=0.57		pg/g	
		Total Hexa CDD	2012/08/17	0.76 J, EDL=0.51		pg/g	
		Total Hepta CDD	2012/08/17	1.19 J, EDL=0.46		pg/g	
		2,3,7,8-Tetra CDF	2012/08/17	0.43 U, EDL=0.43		pg/g	
		1,2,3,7,8-Penta CDF	2012/08/17	0.56 U, EDL=0.56		pg/g	
		2,3,4,7,8-Penta CDF	2012/08/17	0.58 U, EDL=0.58		pg/g	
		1,2,3,4,7,8-Hexa CDF	2012/08/17	0.46 U, EDL=0.46		pg/g	
		1,2,3,6,7,8-Hexa CDF	2012/08/17	0.44 U, EDL=0.44		pg/g	
		2,3,4,6,7,8-Hexa CDF	2012/08/17	0.50 U, EDL=0.50		pg/g	
		1,2,3,7,8,9-Hexa CDF	2012/08/17	0.56 U, EDL=0.56		pg/g	
		1,2,3,4,6,7,8-Hepta CDF	2012/08/17	0.61 U, EDL=0.61 (1)		pg/g	
		1,2,3,4,7,8,9-Hepta CDF	2012/08/17	0.63 U, EDL=0.63 (1)		pg/g	

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report (Continued)

Maxxam Job Number: GB2C1408

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2941551 OBC	Method Blank	Octa CDF	2012/08/17	1.48 J, EDL=0.57		pg/g	
		Total Tetra CDF	2012/08/17	0.43 U, EDL=0.43		pg/g	
		Total Penta CDF	2012/08/17	0.57 U, EDL=0.57		pg/g	
		Total Hexa CDF	2012/08/17	0.49 U, EDL=0.49		pg/g	
		Total Hepta CDF	2012/08/17	0.68 U, EDL=0.68 (1)		pg/g	
2944752 AGU	Method Blank	Confirmation C13-2378 TetraCDF	2012/08/18		100	%	40 - 135
		Confirmation 2,3,7,8-Tetra CDF	2012/08/18	0.41 U, EDL=0.41		pg/g	

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: August 13, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12080704-001
Job No.: 440-19315-1
Sample ID.: 440-19315-1

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled: 08/02/12
Date Received: 08/07/12
Date Tested: 08/08/12 to 08/12/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-19315-1	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1208 0704-001

Client/ID: TA 440-19315-C-1

TEST SUMMARY

Species: ***Pimephales promelas*.**
Fish weight (gm): av: 0.25; min: 0.21; max: 0.29.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	8-8-12 1030			8-9-12 1100				8-10-12 1100				8-11-12 1100				8-12-12 1100			
Analyst:	Z			Z				Z				Z				Z			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.4	8.7	8.1	20.5	8.6	8.1	0	20.5	8.7	8.1	0	20.6	8.7	7.9	0	20.7	8.8	8.0	0
Control B	20.5	8.6	8.1	20.6	8.7	8.1	0	20.6	8.7	8.0	0	20.6	8.7	7.9	0	20.7	8.7	8.1	0
400 mg/l A	20.5	8.7	8.4	20.5	8.6	8.4	0	20.7	8.6	8.1	0	20.7	8.6	8.0	0	20.6	8.7	8.1	0
400 mg/l B	20.6	8.7	8.4	20.6	8.6	8.4	0	20.8	8.6	8.2	0	20.6	8.7	8.1	0	20.7	8.6	8.1	0
750 mg/l A	20.5	8.6	8.6	20.6	8.5	8.4	0	20.7	8.5	8.4	0	20.7	8.7	8.2	0	20.7	8.7	8.2	0
750 mg/l B	20.4	8.7	8.6	20.7	8.6	9.0	0	20.7	8.7	8.6	0	20.7	8.6	8.3	0	20.6	8.8	8.3	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: ~~Yes~~ / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	31 mg/l $CaCO_3$	44 mg/l $CaCO_3$	42 mg/l $CaCO_3$	58 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	45 mg/l $CaCO_3$	45 mg/l $CaCO_3$	60 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-9305.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories				Job #: 440-19315-1

Address: 4350 Transport #107, ,	Due Date Requested: 8/13/2012	
City: Ventura	TAT Requested (days):	
State, Zip: CA, 93003		
Phone:	PO #:	
Email:	WO #:	
Project Name: Waste to Energy	Project #: 44006380	
Site:	SSOW#:	

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
S6-W6comp-080212 (440-19315-1)	8/2/12	13:35 Pacific		Solid			X		

Possible Hazard Identification *Unconfirmed*	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)* ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 8-7-12 9:20	Company	Received by:	Date/Time: 8-7-12 9:00	Company
Relinquished by:	Date/Time: 8-7-12 12:40	Company	Received by:	Date/Time: 8-7-12 12:40	Company ATL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.6°

440-19315

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 08-02-2012	COC No: 4
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier: FedEx	___ of ___ COCs
Address	Analysis Turnaround Time			Job No.
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S6-W6comp-080212	8/2/2012	1335	Glass Jar	solid	3		X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	JT3	8-2-2012 14:30	[signature]	JT3	8-2-2012 1431
[signature]	JT3	8-2-12 1440			

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-19315-1

Login Number: 19315

List Source: TestAmerica Irvine

List Number: 1

Creator: Perez, Angel

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	N/A	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-20194-1
Client Project/Site: Waste to Energy

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
9/4/2012 6:23:38 PM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: JT3 LLC
TestAmerica Job ID: 440-20194-1
Project/Site: Waste to Energy

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-20194-1	S7-W7 comp-080912	Solid	08/09/12 14:30	08/10/12 09:45
OM4901	S7-W7 COMP-080912 (440-20	Soil		

Case Narrative

Client: JT3 LLC

TestAmerica Job ID: 440-20194-1

Project/Site: Waste to Energy

Job ID: 440-20194-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-20194-1

Comments
No additional comments.

Receipt
The sample was received on 8/10/2012 9:45 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 4.7º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-45443 were outside control limits for Mo, Ag, Co, Se, Sb, V, Tl, Cr, Cd, Be, Pb, and Cu. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 6020: The method blank for preparation batch 440-45443 contained Cu above the reporting limit (RL). The associated sample(s) contained detects for this analyte at concentrations greater than 10X the value found in the method blank; therefore, re-extraction and/or re-analysis of samples was not performed.

No other analytical or quality issues were noted.

Subcontract non-Sister
No analytical or quality issues were noted.

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-20194-1

Client Sample ID: S7-W7 comp-080912

Lab Sample ID: 440-20194-1

Date Collected: 08/09/12 14:30

Matrix: Solid

Date Received: 08/10/12 09:45

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	5.9	B	0.51	0.051	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Arsenic	0.98		0.51	0.46	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Barium	380		0.51	0.15	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Beryllium	0.14	J	0.30	0.051	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Cadmium	12		0.51	0.051	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Chromium	38		1.0	0.41	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Cobalt	4.6		0.51	0.051	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Copper	790	B	1.0	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Lead	75	B	0.51	0.10	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Molybdenum	5.5	B	1.0	0.10	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Nickel	68		1.0	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Selenium	0.37	J	1.0	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Thallium	0.13	J	0.51	0.10	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Vanadium	5.4		1.0	0.41	mg/Kg		08/15/12 09:49	08/16/12 10:36	20
Zinc	1800		100	20	mg/Kg		08/15/12 09:49	08/16/12 12:08	200
Antimony	31		1.0	0.15	mg/Kg		08/15/12 09:49	08/16/12 10:36	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/15/12 13:45	08/16/12 15:12	1

Client Sample ID: S7-W7 COMP-080912 (440-20

Lab Sample ID: OM4901

Date Collected:

Matrix: Soil

Date Received:

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	720		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	2190		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	151		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,4,7,8-Hexa CDD	89		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,4,7,8-Hexa CDF	1680		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,6,7,8-Hexa CDD	145		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,6,7,8-Hexa CDF	560		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,7,8,9-Hexa CDD	157		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,7,8,9-Hexa CDF	34	J	50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,7,8-Penta CDD	113		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
1,2,3,7,8-Penta CDF	505		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
2,3,4,6,7,8-Hexa CDF	800		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
2,3,4,7,8-Penta CDF	893		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
2,3,7,8-Tetra CDD	46		20		pg/g		08/17/12 00:00	08/29/12 00:00	1
2,3,7,8-Tetra CDF		A6813	20		pg/g		08/17/12 00:00	08/29/12 00:00	1
2,3,7,8-Tetra CDF	446		10		pg/g		08/17/12 00:00	08/30/12 00:00	1
Octa CDD	1070		100		pg/g		08/17/12 00:00	08/29/12 00:00	1
Octa CDF	606		100		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Hepta CDD	1560		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Hepta CDF	2990		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Hexa CDD	2310		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Hexa CDF	6090		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Penta CDD	1910		50		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Penta CDF	10900		50		pg/g		08/17/12 00:00	08/29/12 00:00	1

Client Sample ID: S7-W7 COMP-080912 (440-20
Lab Sample ID: OM4901
Date Collected:
Matrix: Soil
Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Tetra CDD	**2220**		20		pg/g		08/17/12 00:00	08/29/12 00:00	1
Total Tetra CDF	**14700**		20		pg/g		08/17/12 00:00	08/29/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*56*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-1234678 HeptaCDF	*58*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-123478 HexaCDF	*48*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-123678 HexaCDD	*47*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-12378 PentaCDD	*59*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-12378 PentaCDF	*54*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-2378 TetraCDD	*58*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-2378 TetraCDF	*58*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*
C13-2378 TetraCDF	*62*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-OCDD	*60*		*40 - 135*	*08/17/12 00:00*	*08/29/12 00:00*	*1*

Client Sample ID: S7-W7 comp-080912
Lab Sample ID: 440-20194-1

Date Collected: 08/09/12 14:30
Matrix: Solid
Date Received: 08/10/12 09:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.97 g	50 mL	45443	08/15/12 09:49	DT	TAL IRV
Total/NA	Analysis	6020		20			45822	08/16/12 10:36	NH	TAL IRV
Total/NA	Analysis	6020		200			45822	08/16/12 12:08	NH	TAL IRV
Total/NA	Prep	7471A			0.50 g	50 mL	45489	08/15/12 13:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			45911	08/16/12 15:12	DB	TAL IRV

Client Sample ID: S7-W7 COMP-080912 (440-20
Lab Sample ID: OM4901

Date Collected:
Matrix: Soil
Date Received:

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	NA		1			2952263_P	08/17/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2952263	08/29/12 00:00	OBC	
Total/NA	Prep	NA		1			2955100_P	08/17/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2955100	08/30/12 00:00	AGU	

Laboratory References:

= , , ,

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-45443/1-A ^20
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 45443

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	0.0728	J	0.50	0.050	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Arsenic	ND		0.50	0.45	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Barium	ND		0.50	0.15	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Beryllium	ND		0.30	0.050	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Cadmium	ND		0.50	0.050	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Chromium	ND		0.99	0.40	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Cobalt	ND		0.50	0.050	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Copper	1.25		0.99	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Lead	0.129	J	0.50	0.099	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Molybdenum	0.683	J	0.99	0.099	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Nickel	ND		0.99	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Selenium	ND		0.99	0.25	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Thallium	ND		0.50	0.099	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Vanadium	ND		0.99	0.40	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Zinc	ND		9.9	2.0	mg/Kg		08/15/12 09:49	08/16/12 10:31	20
Antimony	ND		0.99	0.15	mg/Kg		08/15/12 09:49	08/16/12 10:31	20

Lab Sample ID: LCS 440-45443/2-A ^20
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	25.0	22.1		mg/Kg		88	80 - 120
Arsenic	50.0	45.9		mg/Kg		92	80 - 120
Barium	50.0	47.0		mg/Kg		94	80 - 120
Beryllium	50.0	43.7		mg/Kg		87	80 - 120
Cadmium	50.0	46.3		mg/Kg		93	80 - 120
Chromium	50.0	47.5		mg/Kg		95	80 - 120
Cobalt	50.0	48.3		mg/Kg		97	80 - 120
Copper	50.0	48.8		mg/Kg		98	80 - 120
Lead	50.0	48.1		mg/Kg		96	80 - 120
Molybdenum	50.0	46.1		mg/Kg		92	80 - 120
Nickel	50.0	48.0		mg/Kg		96	80 - 120
Selenium	50.0	44.2		mg/Kg		88	80 - 120
Thallium	50.0	47.5		mg/Kg		95	80 - 120
Vanadium	50.0	46.8		mg/Kg		94	80 - 120
Zinc	50.0	46.2		mg/Kg		92	80 - 120
Antimony	50.0	46.8		mg/Kg		94	80 - 120

Lab Sample ID: 440-20194-1 MS
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: S7-W7 comp-080912
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	5.9	B	25.1	23.3	F	mg/Kg		69	80 - 120
Arsenic	0.98		50.3	41.2		mg/Kg		80	80 - 120
Barium	380		50.3	418	4	mg/Kg		66	80 - 120
Beryllium	0.14	J	50.3	38.5	F	mg/Kg		76	80 - 120
Cadmium	12		50.3	51.0	F	mg/Kg		78	80 - 120
Chromium	38		50.3	76.1	F	mg/Kg		76	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 440-20194-1 MS
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: S7-W7 comp-080912
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cobalt	4.6		50.3	44.3	F	mg/Kg		79	80 - 120
Copper	790	B	50.3	401	4	mg/Kg		-783	80 - 120
Lead	75	B	50.3	115	F	mg/Kg		78	80 - 120
Molybdenum	5.5	B	50.3	43.0	F	mg/Kg		75	80 - 120
Nickel	68		50.3	108		mg/Kg		80	80 - 120
Selenium	0.37	J	50.3	36.9	F	mg/Kg		73	80 - 120
Thallium	0.13	J	50.3	23.6	F	mg/Kg		47	80 - 120
Vanadium	5.4		50.3	45.1	F	mg/Kg		79	80 - 120
Antimony	31		50.3	48.4	F	mg/Kg		35	80 - 120

Lab Sample ID: 440-20194-1 MS
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: S7-W7 comp-080912
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	1800		50.3	1910	4	mg/Kg		282	80 - 120

Lab Sample ID: 440-20194-1 MSD
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: S7-W7 comp-080912
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Silver	5.9	B	25.3	27.2		mg/Kg		84	80 - 120	16	20
Arsenic	0.98		50.5	43.5		mg/Kg		84	80 - 120	6	20
Barium	380		50.5	472	4	mg/Kg		172	80 - 120	12	20
Beryllium	0.14	J	50.5	40.7		mg/Kg		80	80 - 120	6	20
Cadmium	12		50.5	55.7		mg/Kg		87	80 - 120	9	20
Chromium	38		50.5	81.2		mg/Kg		86	80 - 120	6	20
Cobalt	4.6		50.5	47.4		mg/Kg		85	80 - 120	7	20
Copper	790	B	50.5	532	4 F	mg/Kg		-520	80 - 120	28	20
Lead	75	B	50.5	123		mg/Kg		94	80 - 120	7	20
Molybdenum	5.5	B	50.5	46.5		mg/Kg		81	80 - 120	8	20
Nickel	68		50.5	115		mg/Kg		93	80 - 120	6	20
Selenium	0.37	J	50.5	39.0	F	mg/Kg		77	80 - 120	6	20
Thallium	0.13	J	50.5	26.1	F	mg/Kg		51	80 - 120	10	20
Vanadium	5.4		50.5	48.3		mg/Kg		85	80 - 120	7	20
Antimony	31		50.5	53.2	F	mg/Kg		44	80 - 120	9	20

Lab Sample ID: 440-20194-1 MSD
Matrix: Solid
Analysis Batch: 45822

Client Sample ID: S7-W7 comp-080912
Prep Type: Total/NA
Prep Batch: 45443

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	1800		50.5	2040	4	mg/Kg		532	80 - 120	6	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-45489/1-A
Matrix: Solid
Analysis Batch: 45911

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 45489

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/15/12 13:45	08/16/12 14:55	1

Lab Sample ID: LCS 440-45489/2-A
Matrix: Solid
Analysis Batch: 45911

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 45489

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.741		mg/Kg		93	80 - 120

Method: EPA 8290 mod. - EPA 8290 mod.

Lab Sample ID: 2952263-BLK
Matrix: Soil
Analysis Batch: 2952263

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2952263_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	0.84	J	22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	ND	A6718	22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,6,7,8-Hexa CDD	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,6,7,8-Hexa CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,7,8-Penta CDD	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
1,2,3,7,8-Penta CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
2,3,4,6,7,8-Hexa CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
2,3,4,7,8-Penta CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
2,3,7,8-Tetra CDD	ND		8.9		pg/g		08/17/12 00:00	08/30/12 00:00	1
2,3,7,8-Tetra CDF	ND		8.9		pg/g		08/17/12 00:00	08/30/12 00:00	1
Octa CDD	ND	A6718	44		pg/g		08/17/12 00:00	08/30/12 00:00	1
Octa CDF	1.23	J	44		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Hepta CDD	1.44	J	22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Hepta CDF	ND	A6718	22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Hexa CDD	ND	A6718	22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Hexa CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Penta CDD	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Penta CDF	ND		22		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Tetra CDD	ND		8.9		pg/g		08/17/12 00:00	08/30/12 00:00	1
Total Tetra CDF	ND		8.9		pg/g		08/17/12 00:00	08/30/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*81*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-1234678 HeptaCDF	*84*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-123478 HexaCDF	*78*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-123678 HexaCDD	*75*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-12378 PentaCDD	*105*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*
C13-12378 PentaCDF	*83*		*40 - 135*	*08/17/12 00:00*	*08/30/12 00:00*	*1*

1 2 3 4 5 6 7 8 9 10 11 12 13

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2952263-BLK
Matrix: Soil
Analysis Batch: 2952263

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2952263_P

Surrogate	Blank %Recovery	Blank Qualifier	Limits	Prepared	Analyzed	Dil Fac
C13-2378 TetraCDD	91		40 - 135	08/17/12 00:00	08/30/12 00:00	1
C13-2378 TetraCDF	79		40 - 135	08/17/12 00:00	08/30/12 00:00	1
C13-OCDD	74		40 - 135	08/17/12 00:00	08/30/12 00:00	1

Lab Sample ID: 2952263-LCS
Matrix: Soil
Analysis Batch: 2952263

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 2952263_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,4,6,7,8-Hepta CDD	100	113		pg/g		113	80 - 140
1,2,3,4,6,7,8-Hepta CDF	100	106		pg/g		106	80 - 140
1,2,3,4,7,8,9-Hepta CDF	100	105		pg/g		105	80 - 140
1,2,3,4,7,8-Hexa CDD	100	125		pg/g		125	80 - 140
1,2,3,4,7,8-Hexa CDF	100	113		pg/g		113	80 - 140
1,2,3,6,7,8-Hexa CDD	100	114		pg/g		114	80 - 140
1,2,3,6,7,8-Hexa CDF	100	110		pg/g		110	80 - 140
1,2,3,7,8,9-Hexa CDD	100	132		pg/g		132	80 - 140
1,2,3,7,8,9-Hexa CDF	100	115		pg/g		115	80 - 140
1,2,3,7,8-Penta CDD	100	121		pg/g		121	80 - 140
1,2,3,7,8-Penta CDF	100	115		pg/g		115	80 - 140
2,3,4,6,7,8-Hexa CDF	100	105		pg/g		105	80 - 140
2,3,4,7,8-Penta CDF	100	118		pg/g		118	80 - 140
2,3,7,8-Tetra CDD	100	108		pg/g		108	80 - 140
2,3,7,8-Tetra CDF	100	105		pg/g		105	80 - 140
Octa CDD	100	109		pg/g		109	80 - 140
Octa CDF	100	110		pg/g		110	80 - 140

Surrogate	LCS %Recovery	LCS Qualifier	Limits
C13-1234678 HeptaCDD	61		40 - 135
C13-1234678 HeptaCDF	62		40 - 135
C13-123478 HexaCDF	55		40 - 135
C13-123678 HexaCDD	56		40 - 135
C13-12378 PentaCDD	74		40 - 135
C13-12378 PentaCDF	62		40 - 135
C13-2378 TetraCDD	64		40 - 135
C13-2378 TetraCDF	57		40 - 135
C13-OCDD	59		40 - 135

Lab Sample ID: 2955100-BLK
Matrix: Soil
Analysis Batch: 2955100

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2955100_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND		3.3		pg/g		08/17/12 00:00	08/30/12 00:00	1

Surrogate	Blank %Recovery	Blank Qualifier	Limits	Prepared	Analyzed	Dil Fac
C13-2378 TetraCDF	71		40 - 135	08/17/12 00:00	08/30/12 00:00	1

QC Association Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-20194-1

Metals

Prep Batch: 45443

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-20194-1	S7-W7 comp-080912	Total/NA	Solid	3050B	
440-20194-1 MS	S7-W7 comp-080912	Total/NA	Solid	3050B	
440-20194-1 MSD	S7-W7 comp-080912	Total/NA	Solid	3050B	
LCS 440-45443/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-45443/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Prep Batch: 45489

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-20194-1	S7-W7 comp-080912	Total/NA	Solid	7471A	
LCS 440-45489/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-45489/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 45822

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-20194-1	S7-W7 comp-080912	Total/NA	Solid	6020	45443
440-20194-1	S7-W7 comp-080912	Total/NA	Solid	6020	45443
440-20194-1 MS	S7-W7 comp-080912	Total/NA	Solid	6020	45443
440-20194-1 MS	S7-W7 comp-080912	Total/NA	Solid	6020	45443
440-20194-1 MSD	S7-W7 comp-080912	Total/NA	Solid	6020	45443
440-20194-1 MSD	S7-W7 comp-080912	Total/NA	Solid	6020	45443
LCS 440-45443/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	45443
MB 440-45443/1-A ^20	Method Blank	Total/NA	Solid	6020	45443

Analysis Batch: 45911

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-20194-1	S7-W7 comp-080912	Total/NA	Solid	7471A	45489
LCS 440-45489/2-A	Lab Control Sample	Total/NA	Solid	7471A	45489
MB 440-45489/1-A	Method Blank	Total/NA	Solid	7471A	45489

Subcontract

Analysis Batch: 2952263

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2952263-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2952263_P
2952263-LCS	Lab Control Sample	Total/NA	Soil	EPA 8290 mod.	2952263_P
OM4901	S7-W7 COMP-080912 (440-20	Total/NA	Soil	EPA 8290 mod.	2952263_P

Analysis Batch: 2955100

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2955100-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2955100_P
OM4901	S7-W7 COMP-080912 (440-20	Total/NA	Soil	EPA 8290 mod.	2955100_P

Prep Batch: 2952263_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2952263-BLK	Method Blank	Total/NA	Soil	NA	
2952263-LCS	Lab Control Sample	Total/NA	Soil	NA	
OM4901	S7-W7 COMP-080912 (440-20	Total/NA	Soil	NA	

Prep Batch: 2955100_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2955100-BLK	Method Blank	Total/NA	Soil	NA	
OM4901	S7-W7 COMP-080912 (440-20	Total/NA	Soil	NA	

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.
F	MS or MSD exceeds the control limits
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
F	RPD of the MS and MSD exceeds the control limits

Subcontract

Qualifier	Qualifier Description
J	Estimated concentration between the EDL and RDL
A6813	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
A6718	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-20194-1

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-12
USDA	Federal		P330-09-00080	06-06-14

Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: na

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/08/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2C3715
Received: 2012/08/15, 11:35

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (8290) (1)	1	2012/08/17	2012/08/29	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	1	N/A	2012/08/30	BRL SOP-00406	EPA 8290 mod.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Total cover pages: 1

Maxxam Job #: B2C3715
Report Date: 2012/08/30

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OM4901						
Sampling Date		2012/08/09 14:30						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**S7-W7 COMP-080912 (440-20194-1)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	46	12	1.00	46.0		2952263	20
1,2,3,7,8-Penta CDD	pg/g	113	23	1.00	113		2952263	50
1,2,3,4,7,8-Hexa CDD	pg/g	89	12	0.100	8.90		2952263	50
1,2,3,6,7,8-Hexa CDD	pg/g	145	10	0.100	14.5		2952263	50
1,2,3,7,8,9-Hexa CDD	pg/g	157	10	0.100	15.7		2952263	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	720	8.2	0.0100	7.20		2952263	50
Octa CDD	pg/g	1070	16	0.000300	0.321		2952263	100
Total Tetra CDD	pg/g	2220	12				2952263	20
Total Penta CDD	pg/g	1910	23				2952263	50
Total Hexa CDD	pg/g	2310	11				2952263	50
Total Hepta CDD	pg/g	1560	8.2				2952263	50
2,3,7,8-Tetra CDF **	pg/g	2400 U (1)	2400	0.100	240		2952263	20
1,2,3,7,8-Penta CDF	pg/g	505	17	0.0300	15.2		2952263	50
2,3,4,7,8-Penta CDF	pg/g	893	18	0.300	268		2952263	50
1,2,3,4,7,8-Hexa CDF	pg/g	1680	10	0.100	168		2952263	50
1,2,3,6,7,8-Hexa CDF	pg/g	560	9.8	0.100	56.0		2952263	50
2,3,4,6,7,8-Hexa CDF	pg/g	800	11	0.100	80.0		2952263	50
1,2,3,7,8,9-Hexa CDF	pg/g	34 J	13	0.100	3.40		2952263	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	2190	7.4	0.0100	21.9		2952263	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	151	9.5	0.0100	1.51		2952263	50
Octa CDF	pg/g	606	13	0.000300	0.182		2952263	100
Total Tetra CDF	pg/g	14700	12				2952263	20
Total Penta CDF	pg/g	10900	17				2952263	50
Total Hexa CDF	pg/g	6090	11				2952263	50
Total Hepta CDF	pg/g	2990	8.3				2952263	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	446	3.9	0.100	44.6		2955100	N/A

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

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1 2 3 4 5 6 7 8 9 10 11 12 13

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OM4901						
Sampling Date		2012/08/09 14:30						
COC Number		na		**TOXIC EQUIVALENCY**		**# of**		
	Units	**S7-W7 COMP-080912 (440-20194-1)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
TOTAL TOXIC EQUIVALENCY	pg/g				864			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	56					2952263	
C13-1234678 HeptaCDF **	%	58					2952263	
C13-123478 HexaCDF	%	48					2952263	
C13-123678 HexaCDD	%	47					2952263	
C13-12378 PentaCDD	%	59					2952263	
C13-12378 PentaCDF	%	54					2952263	
C13-2378 TetraCDD	%	58					2952263	
C13-2378 TetraCDF	%	58					2952263	
C13-OCDD	%	60					2952263	
Confirmation C13-2378 TetraCDF	%	62					2955100	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2C3715
Report Date: 2012/08/30

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

Test Summary

Maxxam ID OM4901
Sample ID S7-W7 COMP-080912 (440-20194-1)
Matrix Soil

Collected 2012/08/09
Shipped
Received 2012/08/15

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2952263	2012/08/17	2012/08/29	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	2955100	N/A	2012/08/30	Angel Guerrero

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

GENERAL COMMENTS

Sample OM4901-01: Results are based on Dry Wt.
Moisture was not available in the LIMS system to calculate concentrations on a wet weight basis.

Results relate only to the items tested.

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report

Maxxam Job Number: GB2C3715

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2952263 OBC	Spiked Blank	C13-1234678 HeptaCDD	2012/08/28		61	%	40 - 135
		C13-1234678 HeptaCDF	2012/08/28		62	%	40 - 135
		C13-123478 HexaCDF	2012/08/28		55	%	40 - 135
		C13-123678 HexaCDD	2012/08/28		56	%	40 - 135
		C13-12378 PentaCDD	2012/08/28		74	%	40 - 135
		C13-12378 PentaCDF	2012/08/28		62	%	40 - 135
		C13-2378 TetraCDD	2012/08/28		64	%	40 - 135
		C13-2378 TetraCDF	2012/08/28		57	%	40 - 135
		C13-OCDD	2012/08/28		59	%	40 - 135
		2,3,7,8-Tetra CDD	2012/08/28		108	%	80 - 140
		1,2,3,7,8-Penta CDD	2012/08/28		121	%	80 - 140
		1,2,3,4,7,8-Hexa CDD	2012/08/28		125	%	80 - 140
		1,2,3,6,7,8-Hexa CDD	2012/08/28		114	%	80 - 140
		1,2,3,7,8,9-Hexa CDD	2012/08/28		132	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDD	2012/08/28		113	%	80 - 140
		Octa CDD	2012/08/28		109	%	80 - 140
		2,3,7,8-Tetra CDF	2012/08/28		105	%	80 - 140
		1,2,3,7,8-Penta CDF	2012/08/28		115	%	80 - 140
		2,3,4,7,8-Penta CDF	2012/08/28		118	%	80 - 140
		1,2,3,4,7,8-Hexa CDF	2012/08/28		113	%	80 - 140
		1,2,3,6,7,8-Hexa CDF	2012/08/28		110	%	80 - 140
		2,3,4,6,7,8-Hexa CDF	2012/08/28		105	%	80 - 140
		1,2,3,7,8,9-Hexa CDF	2012/08/28		115	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDF	2012/08/28		106	%	80 - 140
		1,2,3,4,7,8,9-Hepta CDF	2012/08/28		105	%	80 - 140
		Octa CDF	2012/08/28		110	%	80 - 140
	Method Blank	C13-1234678 HeptaCDD	2012/08/28		81	%	40 - 135
		C13-1234678 HeptaCDF	2012/08/28		84	%	40 - 135
		C13-123478 HexaCDF	2012/08/28		78	%	40 - 135
		C13-123678 HexaCDD	2012/08/28		75	%	40 - 135
		C13-12378 PentaCDD	2012/08/28		105	%	40 - 135
		C13-12378 PentaCDF	2012/08/28		83	%	40 - 135
		C13-2378 TetraCDD	2012/08/28		91	%	40 - 135
		C13-2378 TetraCDF	2012/08/28		79	%	40 - 135
		C13-OCDD	2012/08/28		74	%	40 - 135
		2,3,7,8-Tetra CDD	2012/08/28	0.45 U, EDL=0.45		pg/g	
		1,2,3,7,8-Penta CDD	2012/08/28	0.54 U, EDL=0.54		pg/g	
		1,2,3,4,7,8-Hexa CDD	2012/08/28	0.65 U, EDL=0.65		pg/g	
		1,2,3,6,7,8-Hexa CDD	2012/08/28	0.58 U, EDL=0.58		pg/g	
		1,2,3,7,8,9-Hexa CDD	2012/08/28	0.58 U, EDL=0.58		pg/g	
		1,2,3,4,6,7,8-Hepta CDD	2012/08/28	0.84 J, EDL=0.46		pg/g	
		Octa CDD	2012/08/28	4.7 U, EDL=4.7 (1)		pg/g	
		Total Tetra CDD	2012/08/28	0.45 U, EDL=0.45		pg/g	
		Total Penta CDD	2012/08/28	0.54 U, EDL=0.54		pg/g	
		Total Hexa CDD	2012/08/28	2.7 U, EDL=2.7 (1)		pg/g	
		Total Hepta CDD	2012/08/28	1.44 J, EDL=0.46		pg/g	
		2,3,7,8-Tetra CDF	2012/08/28	0.37 U, EDL=0.37		pg/g	
		1,2,3,7,8-Penta CDF	2012/08/28	0.51 U, EDL=0.51		pg/g	
		2,3,4,7,8-Penta CDF	2012/08/28	0.53 U, EDL=0.53		pg/g	
		1,2,3,4,7,8-Hexa CDF	2012/08/28	0.49 U, EDL=0.49		pg/g	
		1,2,3,6,7,8-Hexa CDF	2012/08/28	0.47 U, EDL=0.47		pg/g	
		2,3,4,6,7,8-Hexa CDF	2012/08/28	0.53 U, EDL=0.53		pg/g	
		1,2,3,7,8,9-Hexa CDF	2012/08/28	0.60 U, EDL=0.60		pg/g	
		1,2,3,4,6,7,8-Hepta CDF	2012/08/28	0.70 U, EDL=0.70 (1)		pg/g	
		1,2,3,4,7,8,9-Hepta CDF	2012/08/28	0.51 U, EDL=0.51		pg/g	

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report (Continued)

Maxxam Job Number: GB2C3715

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2952263 OBC	Method Blank	Octa CDF	2012/08/28	1.23 J, EDL=0.51		pg/g	
		Total Tetra CDF	2012/08/28	0.37 U, EDL=0.37		pg/g	
		Total Penta CDF	2012/08/28	0.52 U, EDL=0.52		pg/g	
		Total Hexa CDF	2012/08/28	0.52 U, EDL=0.52		pg/g	
		Total Hepta CDF	2012/08/28	0.79 U, EDL=0.79 (1)		pg/g	
2955100 AGU	Method Blank	Confirmation C13-2378 TetraCDF	2012/08/30		71	%	40 - 135
		Confirmation 2,3,7,8-Tetra CDF	2012/08/30	0.56 U, EDL=0.56		pg/g	

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756

CA DOHS ELAP Cert. No.: 1775

Date: August 20, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12081407-001
Job No.: 440-20194-1
Sample ID.: 440-20194-1

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled:	08/09/12
Date Received:	08/14/12
Date Tested:	08/16/12 to 08/20/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-20194-1	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1208140 7001

Client/ID: TA 440-20194-C-1

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.26 ; min: 0.21 ; max: 0.31 .
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	8-16-12 1030			8-17-12 1030				8-18-12 1030				8-19-12 1030				8-20-12 1100			
Analyst:	Z			Z				Z				Z				L.A.			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	9.0	8.1	20.5	8.9	8.1	0	20.5	8.7	8.1	0	20.6	8.8	8.1	0	~~20.7~~ 20.6	~~8.7~~ 8.6	~~8.0~~ 8.2	0
Control B	20.5	8.6	8.2	20.6	8.9	8.1	0	20.6	8.8	8.0	0	20.7	8.8	8.1	0	20.7	8.7	8.1	0
400 mg/l A	20.5	9.0	8.5*	20.7	8.7	8.3	0	20.7	8.8	8.0	0	20.6	8.7	8.0	0	20.6	8.5	8.0	0
400 mg/l B	20.5	9.1	8.5*	20.6	8.8	8.3	0	20.8	8.8	8.1	0	20.6	8.8	8.1	0	20.7	8.7	8.1	0
750 mg/l A	20.4	8.9	8.5*	20.7	8.4	8.6	0	20.7	8.8	8.6	0	20.6	8.7	8.2	0	20.6	8.5	8.6	0
750 mg/l B	20.5	8.4	8.5*	20.6	8.9	8.6	0	20.6	8.8	8.6	0	20.6	8.6	8.4	0	20.5	8.7	8.5	0
pH Control	20.6	9.0	8.5*	20.6	8.7	8.1	0	20.7	8.8	8.6	0	20.7	8.7	8.5	0	20.7	8.7	8.4	0

Comments: Extraction method: Mechanical shaking X . * pH = 10.1 adj w/ HCl
None (aqueous solution) — .

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No pH Control adjusted with HCl/NaOH to pH similar to sample tanks

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	**Hardness**	**Alkalinity**	**Hardness**
Initial	31 mg/l $CaCO_3$	44 mg/l $CaCO_3$	32 mg/l $CaCO_3$	44 mg/l $CaCO_3$
Final	32 mg/l $CaCO_3$	44 mg/l $CaCO_3$	72 mg/l $CaCO_3$	109 mg/l $CaCO_3$

Total Number Dead		
Control	0	/20
400 mg/l	0	/20
750 mg/l	0	/20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-9709.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories				Job #: 440-20194-1
Address: 4350 Transport #107, ,	Due Date Requested: 8/17/2012			
City: Ventura	TAT Requested (days):			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Waste to Energy	Project #: 44006380			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	SUBCONTRACT/ Bioassay Haz Waste	Special Instructions/Note:
S7-W7 comp-080912 (440-20194-1)	8/9/12	14:30 Pacific		Solid	X	

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 8/14/12 12:35	Company TAI	Received by: [signature]	Date/Time: 8/14/12 12:35	Company TA
Relinquished by: [signature]	Date/Time: 8/14/12 3:00pm	Company TA	Received by: [signature]	Date/Time: 8-14-12 3:00	Company ATL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 4.1		

440-20194

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager: Steve Madoski 277-1411**	**Site Contact: Cat McDonald 277-1431**	**Date: 08-09-2012**
Steve Madoski	**Tel/Fax:**	**Lab Contact: maung Thein 277-9648**	**Carrier: FedEx**
Address	**Analysis Turnaround Time**		
Edwards AFB	Calendar (C) or Work Days (W) 10 Day		
661-277-1411 Phone	TAT if different from Below ____		
(xxx) xxx-xxxx FAX	☐ 2 weeks		
Project Name: Waste to Energy	☐ 1 week		
Site: LandFill	☐ 2 days		
P O #	☐ 1 day		

COC No: 5
____ of ____ COCs
Job No.
SDG No.

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S7-W7comp-080912	8/9/2012	14:30	Glass Jar	solid	3		X	X	X	# 10DAY Turnaround.

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☑ *Disposal By Lab* ☐ *Archive For ____ Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by: [signature]	Company: JT3	Date/Time: 8-9-2012 15:00	Received by: V Bang	Company: TAL 48 °C	Date/Time: 8/10/12 9:45
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-20194-1

Login Number: 20194
List Number: 1
Creator: King, Ronald

List Source: TestAmerica Irvine

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Not on coc
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

1 2 3 4 5 6 7 8 9 10 11 12

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-21267-1
Client Project/Site: Waste to Energy

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
9/12/2012 3:15:02 PM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-21267-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-21267-1	S8-W8-comp-082212	Solid	08/22/12 10:35	08/23/12 09:50

Client Sample ID: S8-W8-comp-082212

Date Collected: 08/22/12 10:35
Date Received: 08/23/12 09:50

Lab Sample ID: 440-21267-1
Matrix: Solid

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**10**		0.50	0.050	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Arsenic	**1.1**		0.50	0.45	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Barium	**470**		0.50	0.15	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Beryllium	**0.27**	**J**	0.30	0.050	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Cadmium	**31**		0.50	0.050	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Chromium	**46**		1.0	0.40	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Cobalt	**4.0**		0.50	0.050	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Copper	**310**		1.0	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Lead	**210**	**B**	0.50	0.10	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Molybdenum	**7.6**		1.0	0.10	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Nickel	**72**		1.0	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Selenium	ND		1.0	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Thallium	ND		0.50	0.10	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Vanadium	**4.5**		1.0	0.40	mg/Kg		08/29/12 08:00	08/29/12 18:55	20
Zinc	**2800**		50	10	mg/Kg		08/29/12 08:00	08/30/12 09:49	100
Antimony	**32**	**B**	1.0	0.15	mg/Kg		08/29/12 08:00	08/29/12 18:55	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/23/12 12:50	08/24/12 14:39	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**685**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**838**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	58.1	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,4,7,8-Hexa CDD	84	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**281**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,6,7,8-Hexa CDD	155	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**275**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,7,8,9-Hexa CDD	113	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,7,8,9-Hexa CDF	10.1	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,7,8-Penta CDD	96.2	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
1,2,3,7,8-Penta CDF	181	J	200		pg/g		09/01/12 00:00	09/07/12 00:00	1
2,3,4,6,7,8-Hexa CDF	**386**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
2,3,4,7,8-Penta CDF	**364**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
2,3,7,8-Tetra CDD		A0409	78		pg/g		09/01/12 00:00	09/07/12 00:00	1
2,3,7,8-Tetra CDF		A0205	78		pg/g		09/01/12 00:00	09/07/12 00:00	1
2,3,7,8-Tetra CDF	**186**		16		pg/g		09/01/12 00:00	09/10/12 00:00	1
Octa CDD	**643**		390		pg/g		09/01/12 00:00	09/07/12 00:00	1
Octa CDF	159	J	390		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Hepta CDD	**1620**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Hepta CDF	**1170**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Hexa CDD	**3270**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Hexa CDF	**3060**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Penta CDD	**2900**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Penta CDF	**4690**		200		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Tetra CDD	**2230**		78		pg/g		09/01/12 00:00	09/07/12 00:00	1
Total Tetra CDF	**6950**		78		pg/g		09/01/12 00:00	09/07/12 00:00	1

Client Sample Results

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-21267-1

Client Sample ID: S8-W8-comp-082212
Date Collected: 08/22/12 10:35
Date Received: 08/23/12 09:50

Lab Sample ID: 440-21267-1
Matrix: Solid

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*79*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-1234678 HeptaCDF	*84*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-123478 HexaCDF	*75*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-123678 HexaCDD	*72*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-12378 PentaCDD	*78*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-12378 PentaCDF	*72*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-2378 TetraCDD	*74*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-2378 TetraCDF	*73*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*
C13-2378 TetraCDF	*69*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-OCDD	*77*		*40 - 135*	*09/01/12 00:00*	*09/07/12 00:00*	*1*

Client Sample ID: S8-W8-comp-082212
Lab Sample ID: 440-21267-1
Date Collected: 08/22/12 10:35
Matrix: Solid
Date Received: 08/23/12 09:50

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.50 g	50 mL	47195	08/23/12 12:50	SN	TAL IRV
Total/NA	Analysis	7471A		1			47725	08/24/12 14:39	DB	TAL IRV
Total/NA	Prep	3050B			2.01 g	50 mL	48546	08/29/12 08:00	DT	TAL IRV
Total/NA	Analysis	6020		20			48863	08/29/12 18:55	RC	TAL IRV
Total/NA	Analysis	6020		100			48944	08/30/12 09:49	RC	TAL IRV
Total/NA	Prep	NA		1			2965689_P	09/01/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2965689	09/10/12 00:00	AGU	
Total/NA	Prep	NA		1			2963365_P	09/01/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2963365	09/07/12 00:00	OBC	

Laboratory References:

= , , ,

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-21267-1

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-48546/1-A ^20
Matrix: Solid
Analysis Batch: 48863

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 48546

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.49	0.049	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Arsenic	ND		0.49	0.44	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Barium	ND		0.49	0.15	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Beryllium	ND		0.30	0.049	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Cadmium	ND		0.49	0.049	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Chromium	ND		0.99	0.39	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Cobalt	ND		0.49	0.049	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Copper	ND		0.99	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Lead	0.102	J	0.49	0.099	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Molybdenum	ND		0.99	0.099	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Nickel	ND		0.99	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Selenium	ND		0.99	0.25	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Thallium	ND		0.49	0.099	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Vanadium	ND		0.99	0.39	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Zinc	ND		9.9	2.0	mg/Kg		08/29/12 08:00	08/29/12 18:19	20
Antimony	0.162	J	0.99	0.15	mg/Kg		08/29/12 08:00	08/29/12 18:19	20

Lab Sample ID: LCS 440-48546/2-A ^20
Matrix: Solid
Analysis Batch: 48863

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 48546

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	25.0	22.2		mg/Kg		89	80 - 120
Arsenic	50.0	46.2		mg/Kg		92	80 - 120
Barium	50.0	47.6		mg/Kg		95	80 - 120
Beryllium	50.0	42.8		mg/Kg		86	80 - 120
Cadmium	50.0	46.5		mg/Kg		93	80 - 120
Chromium	50.0	48.2		mg/Kg		96	80 - 120
Cobalt	50.0	46.7		mg/Kg		93	80 - 120
Copper	50.0	47.2		mg/Kg		94	80 - 120
Lead	50.0	49.2		mg/Kg		98	80 - 120
Molybdenum	50.0	46.2		mg/Kg		92	80 - 120
Nickel	50.0	46.9		mg/Kg		94	80 - 120
Selenium	50.0	44.3		mg/Kg		89	80 - 120
Thallium	50.0	48.5		mg/Kg		97	80 - 120
Vanadium	50.0	46.5		mg/Kg		93	80 - 120
Zinc	50.0	46.4		mg/Kg		93	80 - 120
Antimony	50.0	46.7		mg/Kg		93	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-47195/1-A
Matrix: Solid
Analysis Batch: 47725

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 47195

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		08/23/12 12:50	08/24/12 13:44	1

QC Sample Results

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-21267-1

Method: 7471A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 440-47195/2-A
Matrix: Solid
Analysis Batch: 47725

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 47195

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.757		mg/Kg		95	80 - 120

Method: EPA 8290 mod. - EPA 8290 mod.

Lab Sample ID: 2963365-BLK
Matrix: Soil
Analysis Batch: 2963365

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2963365_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	6.42	J	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	2.72	J	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,6,7,8-Hexa CDD	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,6,7,8-Hexa CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,7,8-Penta CDD	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
1,2,3,7,8-Penta CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
2,3,4,6,7,8-Hexa CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
2,3,4,7,8-Penta CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
2,3,7,8-Tetra CDD	ND		13		pg/g		09/01/12 00:00	09/10/12 00:00	1
2,3,7,8-Tetra CDF	11.7	J	13		pg/g		09/01/12 00:00	09/10/12 00:00	1
Octa CDD	37.1	J	67		pg/g		09/01/12 00:00	09/10/12 00:00	1
Octa CDF	ND	A0409	67		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Hepta CDD	10.1	J	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Hepta CDF	2.72	J	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Hexa CDD	ND	A0409	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Hexa CDF	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Penta CDD	ND		33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Penta CDF	6.5	J	33		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Tetra CDD	ND	A0409	13		pg/g		09/01/12 00:00	09/10/12 00:00	1
Total Tetra CDF	25		13		pg/g		09/01/12 00:00	09/10/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*54*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-1234678 HeptaCDF	*52*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-123478 HexaCDF	*51*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-123678 HexaCDD	*49*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-12378 PentaCDD	*55*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-12378 PentaCDF	*48*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-2378 TetraCDD	*49*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-2378 TetraCDF	*46*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*
C13-OCDD	*50*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2963365-LCS
Matrix: Soil
Analysis Batch: 2963365

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 2963365_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,4,6,7,8-Hepta CDD	100	93		pg/g		93	80 - 140
1,2,3,4,6,7,8-Hepta CDF	100	94		pg/g		94	80 - 140
1,2,3,4,7,8,9-Hepta CDF	100	97		pg/g		97	80 - 140
1,2,3,4,7,8-Hexa CDD	100	104		pg/g		104	80 - 140
1,2,3,4,7,8-Hexa CDF	100	97		pg/g		97	80 - 140
1,2,3,6,7,8-Hexa CDD	100	103		pg/g		103	80 - 140
1,2,3,6,7,8-Hexa CDF	100	92		pg/g		92	80 - 140
1,2,3,7,8,9-Hexa CDD	100	106		pg/g		106	80 - 140
1,2,3,7,8,9-Hexa CDF	100	97		pg/g		97	80 - 140
1,2,3,7,8-Penta CDD	100	104		pg/g		104	80 - 140
1,2,3,7,8-Penta CDF	100	106		pg/g		106	80 - 140
2,3,4,6,7,8-Hexa CDF	100	91		pg/g		91	80 - 140
2,3,4,7,8-Penta CDF	100	111		pg/g		111	80 - 140
2,3,7,8-Tetra CDD	100	93		pg/g		93	80 - 140
2,3,7,8-Tetra CDF	100	97		pg/g		97	80 - 140
Octa CDD	100	102		pg/g		102	80 - 140
Octa CDF	100	105		pg/g		105	80 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
C13-1234678 HeptaCDD	*79*		*40 - 135*
C13-1234678 HeptaCDF	*80*		*40 - 135*
C13-123478 HexaCDF	*77*		*40 - 135*
C13-123678 HexaCDD	*73*		*40 - 135*
C13-12378 PentaCDD	*91*		*40 - 135*
C13-12378 PentaCDF	*81*		*40 - 135*
C13-2378 TetraCDD	*84*		*40 - 135*
C13-2378 TetraCDF	*77*		*40 - 135*
C13-OCDD	*77*		*40 - 135*

Lab Sample ID: 2965689-BLK
Matrix: Soil
Analysis Batch: 2965689

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2965689_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND		13		pg/g		09/01/12 00:00	09/10/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-2378 TetraCDF	*111*		*40 - 135*	*09/01/12 00:00*	*09/10/12 00:00*	*1*

QC Association Summary

Metals

Prep Batch: 47195

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	7471A	
LCS 440-47195/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-47195/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 47725

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	7471A	47195
LCS 440-47195/2-A	Lab Control Sample	Total/NA	Solid	7471A	47195
MB 440-47195/1-A	Method Blank	Total/NA	Solid	7471A	47195

Prep Batch: 48546

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	3050B	
LCS 440-48546/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-48546/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 48863

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	6020	48546
LCS 440-48546/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	48546
MB 440-48546/1-A ^20	Method Blank	Total/NA	Solid	6020	48546

Analysis Batch: 48944

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	6020	48546

Subcontract

Analysis Batch: 2963365

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2963365-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2963365_P
2963365-LCS	Lab Control Sample	Total/NA	Soil	EPA 8290 mod.	2963365_P
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	EPA 8290 mod.	2963365_P

Analysis Batch: 2965689

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2965689-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2965689_P
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	EPA 8290 mod.	2965689_P

Prep Batch: 2963365_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2963365-BLK	Method Blank	Total/NA	Soil	NA	
2963365-LCS	Lab Control Sample	Total/NA	Soil	NA	
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	NA	

Prep Batch: 2965689_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2965689-BLK	Method Blank	Total/NA	Soil	NA	
440-21267-1	S8-W8-comp-082212	Total/NA	Solid	NA	

Qualifiers

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Subcontract

Qualifier	Qualifier Description
J	Estimated concentration between the EDL and RDL
A0409	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A0205	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-21267-1

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: August 29, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12082402-001
Job No.: 440-21267-1
Sample ID.: 440-21267-1

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled: 08/22/12
Date Received: 08/24/12
Date Tested: 08/25/12 to 08/29/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-21267-1	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1208240 2-001

Client/ID: TA 440 - 21267-1
S8 - WS - comp - 082212

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.26; min: 0.21; max: 0.31.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	8-25-12 1130			8-26-12 1100				8-27-12 1000				8-28-12 1030				8-29-12 1030			
Analyst:	[illegible]			[illegible]				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.4	8.4	8.2	20.6	8.8	8.1	0	20.5	8.9	7.8	0	20.9	8.8	8.1	0	20.9	8.8	8.4	0
Control B	20.4	8.8	8.1	20.6	8.9	8.0	0	20.7	8.9	7.8	0	21.0	8.8	8.1	0	20.9	8.8	8.4	0
400 mg/l A	20.5	8.8	8.5*	21	8.7	8.3	0	20.7	8.9	8.0	0	20.9	8.7	7.9	0	20.9	8.7	8.1	0
400 mg/l B	20.8	8.7	8.5*	20.6	8.9	8.3	0	20.8	8.8	8.1	0	20.9	8.7	8.0	0	20.9	8.6	8.2	0
750 mg/l A	20.7	8.8	8.5*	20.6	8.9	8.6	0	20.8	8.6	8.9	0	20.9	8.6	8.4	0	20.9	8.6	8.2	0
750 mg/l B	20.7	8.4	8.5*	20.6	8.8	8.6	0	20.8	8.9	8.6	0	21.0	8.7	8.4	0	20.9	8.7	8.2	0
pH Control	20.8	8.6	8.5*	20.5	9.0	8.6	0	20.8	8.8	8.6	0	21.1	8.7	8.5	0	20.9	8.8	8.4	0

Comments: Extraction method: Mechanical shaking X. *initial pH > 10.0
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No *pH Control adjusted with HCl/NaOH to pH similar to sample tanks

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	32 mg/l $CaCO_3$	44 mg/l $CaCO_3$	33 mg/l $CaCO_3$	82 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	58 mg/l $CaCO_3$	112 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS
(the checked result applies based on fish survival rates)

✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-10296.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories		**Analysis Requested**		Job #: 440-21267-1
Address: 4350 Transport #107, ,	**Due Date Requested:** 8/31/2012			**Preservation Codes:**
City: Ventura	**TAT Requested (days):**			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Waste to Energy	Project #: 44006380			
Site:	SSOW#:			Other:

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)		SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
S8-W8-comp-082212 (440-21267-1)	8/22/12	10:35 Pacific		Solid			X		

Possible Hazard Identification *Unconfirmed*	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)* ☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify)	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Yu Bank	8-21-12 9:00		[signature]	8-24-12 9:00	
[signature]	8-24-12 10:05	MLA	Stephanie [illegible]	8-24-12 10:05	WECK
[signature]	8-24-12 12:05		[signature]	8/24/12 12:05	TA

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 0.9°

[signature] 8/24/12 1:25pm [signature] 8-24-12 13:25 ATC

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

440-21267

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 08-22-2012	COC No: 6
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier: FedEx	____ of ____ COCs
Address	Analysis Turnaround Time			Job No.
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
S8-W8-comp-082212	8/22/2012	1035	Glass Jar	solid	3		X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant Poison B ☐ Unknown ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For ______ Months

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Brian P. Stone	JT3/CH2MHILL	8/22/12 1145	[signature]	JT3	8-22-2012 11:50
[signature]	JT3	8-22-2012 12:05	[signature]	TAI	8-23-12 0950

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-21267-1

Login Number: 21267

List Source: TestAmerica Irvine

List Number: 1

Creator: Freitag, Kevin R

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-22022-1
Client Project/Site: Waste to Energy

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
9/20/2012 3:27:49 PM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-22022-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-22022-1	W9-daily comp-081312	Solid	08/29/12 13:55	08/30/12 09:40
440-22022-2	W9-daily comp-081412	Solid	08/29/12 14:05	08/30/12 09:40
440-22022-3	W9-daily comp-081512	Solid	08/29/12 14:15	08/30/12 09:40
440-22022-4	W9-daily comp-081612	Solid	08/29/12 14:30	08/30/12 09:40
440-22022-5	W9-daily comp-081712	Solid	08/29/12 14:35	08/30/12 09:40
440-22022-6	W9-daily comp-081812	Solid	08/29/12 14:40	08/30/12 09:40

Case Narrative

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-22022-1

Job ID: 440-22022-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-22022-1

Comments
No additional comments.

Receipt
The samples were received on 8/30/2012 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 22.0º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-50409 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-50409 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

Subcontract non-Sister
No analytical or quality issues were noted.

Client Sample Results

Client: JT3 LLC

Project/Site: Waste to Energy

TestAmerica Job ID: 440-22022-1

Client Sample ID: W9-daily comp-081312

Lab Sample ID: 440-22022-1

Date Collected: 08/29/12 13:55

Matrix: Solid

Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**4.7**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Arsenic	**1.4**		0.50	0.45	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Barium	**400**		0.50	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Beryllium	**0.23**	**J**	0.30	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Cadmium	**6.7**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Chromium	**27**		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Cobalt	**5.2**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Copper	**200**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 19:30	20
Lead	**94**		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 19:30	20
Molybdenum	**11**		1.0	0.10	mg/Kg		09/07/12 09:09	09/07/12 19:30	20
Nickel	**29**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Selenium	ND		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Thallium	ND		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Vanadium	**6.1**		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:32	20
Zinc	**2000**		100	20	mg/Kg		09/07/12 09:09	09/07/12 19:40	200
Antimony	**74**		1.0	0.15	mg/Kg		09/07/12 09:09	09/07/12 19:30	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		09/06/12 12:45	09/07/12 01:01	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	14.3	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	ND		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	1.6	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	4.3	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	1.7	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	5.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	4.8	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	6.7	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	1.7	J	20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**25**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	8	J	9.8		pg/g		09/07/12 00:00	09/17/12 00:00	1
Octa CDD	77.6	J	98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	9.8	J	98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	24.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	7.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDF	23.9	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	9.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	**61**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	16.3	J	20		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	**181**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1

Client Sample ID: W9-DAILY COMP-081312 (440

Lab Sample ID: 440-22022-1

Date Collected:
Matrix: Soil
Date Received:

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*59*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*57*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*57*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*59*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*74*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDF	*62*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDD	*74*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*63*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*73*		*40 - 135*	*09/07/12 00:00*	*09/17/12 00:00*	*1*
C13-OCDD	*58*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	ND		1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081412

Lab Sample ID: 440-22022-2

Date Collected: 08/29/12 14:05
Matrix: Solid
Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**0.67**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Arsenic	ND		0.50	0.45	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Barium	**78**		0.50	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Beryllium	**0.29**	**J**	0.30	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Cadmium	**0.84**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Chromium	**2.0**		0.99	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Cobalt	**0.49**	**J**	0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Copper	**70**		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 19:57	20
Lead	**6.5**		0.50	0.099	mg/Kg		09/07/12 09:09	09/07/12 19:57	20
Molybdenum	**1.4**		0.99	0.099	mg/Kg		09/07/12 09:09	09/07/12 19:57	20
Nickel	**2.5**		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Selenium	ND		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Thallium	**0.21**	**J**	0.50	0.099	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Vanadium	**0.72**	**J**	0.99	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Zinc	**340**		9.9	2.0	mg/Kg		09/07/12 09:09	09/07/12 17:42	20
Antimony	**2.4**		0.99	0.15	mg/Kg		09/07/12 09:09	09/07/12 19:57	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		09/06/12 12:45	09/07/12 01:03	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	12.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	33	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	8.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	2.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	17.7	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	3.18	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	25.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	5.8	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1

Client Sample ID: W9-DAILY COMP-081412 (440

Lab Sample ID: 440-22022-2

Date Collected:
Matrix: Soil
Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,7,8,9-Hexa CDF	3	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	4.9	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	44.1	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	22.7	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	**51**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	5.4	J	20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**300**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**62.4**		9.8		pg/g		09/07/12 00:00	09/17/12 00:00	1
Octa CDD	ND	A1911	98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	11.1	J	98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	22.1	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	**54**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	37.1	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDF	**186**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	27.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	**586**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	**46**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	**1910**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*85*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*81*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*78*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*83*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*99*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDF	*84*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDD	*102*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*86*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*100*		*40 - 135*	*09/07/12 00:00*	*09/17/12 00:00*	*1*
C13-OCDD	*78*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	0.2	J	1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081512

Lab Sample ID: 440-22022-3

Date Collected: 08/29/12 14:15
Matrix: Solid
Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**0.61**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Arsenic	ND		0.50	0.45	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Barium	**58**		0.50	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Beryllium	ND		0.30	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Cadmium	**0.22**	**J**	0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Chromium	**150**		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Cobalt	**2.4**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Copper	**44**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 20:00	20
Lead	**10**		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:00	20
Molybdenum	**0.72**	**J**	1.0	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:00	20
Nickel	**92**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:45	20

Client Sample ID: W9-daily comp-081512
Lab Sample ID: 440-22022-3
Date Collected: 08/29/12 14:15
Matrix: Solid
Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	ND		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Thallium	ND		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Vanadium	ND		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 20:00	20
Zinc	**150**		10	2.0	mg/Kg		09/07/12 09:09	09/07/12 17:45	20
Antimony	**5.2**		1.0	0.15	mg/Kg		09/07/12 09:09	09/07/12 20:00	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		09/06/12 12:45	09/07/12 01:06	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	32	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**163**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	48.3	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	6.1	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**139**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	7.97	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**139**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	16	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	15.7	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	**214**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	**112**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	**279**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	12.3	J	20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**1320**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**236**		9.9		pg/g		09/07/12 00:00	09/17/12 00:00	1
Octa CDD	85.8	J	99		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	73.4	J	99		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	**56**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	**301**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	**85**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDF	**1150**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	**177**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	**3400**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	**370**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	**8410**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*73*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*70*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*72*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*75*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*88*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDF	*76*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDD	*92*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*77*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*91*		*40 - 135*	*09/07/12 00:00*	*09/17/12 00:00*	*1*
C13-OCDD	*67*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: W9-DAILY COMP-081512 (440 — Lab Sample ID: 440-22022-3

Date Collected: — **Matrix: Soil**

Date Received:

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	0.2	J	1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081612 — Lab Sample ID: 440-22022-4

Date Collected: 08/29/12 14:30 — **Matrix: Solid**

Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**18**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Arsenic	**2.1**		0.50	0.45	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Barium	**440**		0.50	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Beryllium	**0.21**	**J**	0.30	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Cadmium	**26**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Chromium	**40**		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Cobalt	**23**		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Copper	**330**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 20:02	20
Lead	**300**		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:02	20
Molybdenum	**23**		1.0	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:02	20
Nickel	**67**		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Selenium	**0.47**	**J**	1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Thallium	ND		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Vanadium	**7.6**		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:47	20
Zinc	**2500**		100	20	mg/Kg		09/07/12 09:09	09/07/12 20:05	200
Antimony	**52**		1.0	0.15	mg/Kg		09/07/12 09:09	09/07/12 20:02	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.029**		0.020	0.012	mg/Kg		09/06/12 12:45	09/07/12 01:08	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**1650**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**5740**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	**557**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	**216**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**3110**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	**272**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**2180**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	**348**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	**78**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	**265**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	**1720**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	**2270**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	**2850**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	**73**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**6590**		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**1230**		9.8		pg/g		09/07/12 00:00	09/17/12 00:00	1
Octa CDD	**2220**		98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	**1540**		98		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	**2940**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	**8140**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	**3900**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-22022-1

Client Sample ID: W9-DAILY COMP-081612 (440
Lab Sample ID: 440-22022-4
Date Collected:
Matrix: Soil
Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Hexa CDF	20000		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	2940		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	32900		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	2320		20		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	40100		20		pg/g		09/07/12 00:00	09/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*71*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*67*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*66*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*68*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*77*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDF	*69*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDD	*84*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*74*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*83*		*40 - 135*	*09/07/12 00:00*	*09/17/12 00:00*	*1*
C13-OCDD	*67*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	ND		1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081712
Lab Sample ID: 440-22022-5
Date Collected: 08/29/12 14:35
Matrix: Solid
Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	24		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Arsenic	3.0		0.50	0.45	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Barium	520		0.50	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Beryllium	0.77		0.30	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Cadmium	79		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Chromium	42		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Cobalt	27		0.50	0.050	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Copper	570		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 20:08	20
Lead	230		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:08	20
Molybdenum	15		1.0	0.10	mg/Kg		09/07/12 09:09	09/07/12 20:08	20
Nickel	94		1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Selenium	0.27	J	1.0	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Thallium	ND		0.50	0.10	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Vanadium	13		1.0	0.40	mg/Kg		09/07/12 09:09	09/07/12 17:49	20
Zinc	2700		100	20	mg/Kg		09/07/12 09:09	09/07/12 20:10	200
Antimony	62		1.0	0.15	mg/Kg		09/07/12 09:09	09/07/12 20:08	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.013	J	0.020	0.012	mg/Kg		09/06/12 12:45	09/07/12 01:11	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	58		49		pg/g		09/07/12 00:00	09/15/12 00:00	1

Client Sample ID: W9-DAILY COMP-081712 (440

Lab Sample ID: 440-22022-5

Date Collected:

Matrix: Soil

Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDF	**103**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	17.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	9.8	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**125**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	11.4	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**59**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND	A1913	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	2.8	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	16.2	J	49		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	**102**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	**57**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	**125**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	17.3	J	19		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**234**		9.7		pg/g		09/07/12 00:00	09/10/12 00:00	1
2,3,7,8-Tetra CDF	**755**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDD	54	J	97		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	32.1	J	97		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	**99**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	**165**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	**170**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDF	**502**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	**219**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	**1600**		49		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	**522**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	**5930**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*74*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*69*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*69*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*72*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*82*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDF	*72*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDD	*86*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-2378 TetraCDF	*81*		*40 - 135*	*09/07/12 00:00*	*09/10/12 00:00*	*1*
C13-2378 TetraCDF	*76*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-OCDD	*68*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	ND		1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081812

Lab Sample ID: 440-22022-6

Date Collected: 08/29/12 14:40

Matrix: Solid

Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**25**		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Arsenic	**1.4**		0.49	0.44	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Barium	**300**		0.49	0.15	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Beryllium	**0.41**		0.30	0.049	mg/Kg		09/07/12 09:09	09/07/12 18:02	20

Client Sample ID: W9-daily comp-081812
Lab Sample ID: 440-22022-6
Date Collected: 08/29/12 14:40
Matrix: Solid
Date Received: 08/30/12 09:40

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**120**		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Chromium	**46**		0.99	0.39	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Cobalt	**15**		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Copper	**5500**		9.9	2.5	mg/Kg		09/07/12 09:09	09/07/12 20:18	200
Lead	**160**		0.49	0.099	mg/Kg		09/07/12 09:09	09/07/12 20:13	20
Molybdenum	**10**		0.99	0.099	mg/Kg		09/07/12 09:09	09/07/12 20:13	20
Nickel	**110**		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Selenium	ND		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Thallium	ND		0.49	0.099	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Vanadium	**13**		0.99	0.39	mg/Kg		09/07/12 09:09	09/07/12 18:02	20
Zinc	**1600**		99	20	mg/Kg		09/07/12 09:09	09/07/12 20:18	200
Antimony	**37**		0.99	0.15	mg/Kg		09/07/12 09:09	09/07/12 20:13	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.20**		0.020	0.012	mg/Kg		09/06/12 12:40	09/06/12 22:36	1

Method: EPA 8290 mod. - EPA 8290 mod.

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**730**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**3490**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	**282**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	**89**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**2340**	**A1885**	48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	**97**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**716**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	**277**	**A1885**	48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	36	J	48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDD	ND	A1913	48		pg/g		09/07/12 00:00	09/15/12 00:00	1
1,2,3,7,8-Penta CDF	**533**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	**1010**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,4,7,8-Penta CDF	**759**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDD	**31**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**2450**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1
2,3,7,8-Tetra CDF	**348**		9.5		pg/g		09/07/12 00:00	09/18/12 00:00	1
Octa CDD	**1950**		95		pg/g		09/07/12 00:00	09/15/12 00:00	1
Octa CDF	**1960**		95		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDD	**1350**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hepta CDF	**5090**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDD	**1110**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Hexa CDF	**8000**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDD	**555**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Penta CDF	**11800**		48		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDD	**456**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1
Total Tetra CDF	**14600**		19		pg/g		09/07/12 00:00	09/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*78*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*75*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123478 HexaCDF	*76*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-123678 HexaCDD	*78*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*
C13-12378 PentaCDD	*97*		*40 - 135*	*09/07/12 00:00*	*09/15/12 00:00*	*1*

Client Sample ID: W9-DAILY COMP-081812 (440
Lab Sample ID: 440-22022-6
Date Collected:
Matrix: Soil
Date Received:

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
C13-12378 PentaCDF	80		40 - 135	09/07/12 00:00	09/15/12 00:00	1
C13-2378 TetraCDD	98		40 - 135	09/07/12 00:00	09/15/12 00:00	1
C13-2378 TetraCDF	82		40 - 135	09/07/12 00:00	09/15/12 00:00	1
C13-2378 TetraCDF	96		40 - 135	09/07/12 00:00	09/18/12 00:00	1
C13-OCDD	75		40 - 135	09/07/12 00:00	09/15/12 00:00	1

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	0.2	J	1		%		09/05/12 00:00	09/05/12 00:00	1

Client Sample ID: W9-daily comp-081312

Lab Sample ID: 440-22022-1

Date Collected: 08/29/12 13:55

Matrix: Solid

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.50 g	50 mL	50150	09/06/12 12:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			50454	09/07/12 01:01	DB	TAL IRV
Total/NA	Prep	3050B			1.99 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 17:32	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 19:30	RC	TAL IRV
Total/NA	Analysis	6020		200			50849	09/07/12 19:40	RC	TAL IRV
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/17/12 00:00	AGU	
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Client Sample ID: W9-daily comp-081412

Lab Sample ID: 440-22022-2

Date Collected: 08/29/12 14:05

Matrix: Solid

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.50 g	50 mL	50150	09/06/12 12:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			50454	09/07/12 01:03	DB	TAL IRV
Total/NA	Prep	3050B			2.02 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 17:42	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 19:57	RC	TAL IRV
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/17/12 00:00	AGU	
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Client Sample ID: W9-daily comp-081512

Lab Sample ID: 440-22022-3

Date Collected: 08/29/12 14:15

Matrix: Solid

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.51 g	50 mL	50150	09/06/12 12:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			50454	09/07/12 01:06	DB	TAL IRV
Total/NA	Prep	3050B			1.99 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 17:45	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 20:00	RC	TAL IRV
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/17/12 00:00	AGU	

Client Sample ID: W9-DAILY COMP-081512 (440 Lab Sample ID: 440-22022-3

Date Collected: **Matrix: Soil**

Date Received:

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Client Sample ID: W9-daily comp-081612 Lab Sample ID: 440-22022-4

Date Collected: 08/29/12 14:30 **Matrix: Solid**

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.51 g	50 mL	50150	09/06/12 12:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			50454	09/07/12 01:08	DB	TAL IRV
Total/NA	Prep	3050B			1.99 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 17:47	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 20:02	RC	TAL IRV
Total/NA	Analysis	6020		200			50849	09/07/12 20:05	RC	TAL IRV
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/17/12 00:00	AGU	
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Client Sample ID: W9-daily comp-081712 Lab Sample ID: 440-22022-5

Date Collected: 08/29/12 14:35 **Matrix: Solid**

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.51 g	50 mL	50150	09/06/12 12:45	SN	TAL IRV
Total/NA	Analysis	7471A		1			50454	09/07/12 01:11	DB	TAL IRV
Total/NA	Prep	3050B			2.00 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 17:49	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 20:08	RC	TAL IRV
Total/NA	Analysis	6020		200			50849	09/07/12 20:10	RC	TAL IRV
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/10/12 00:00	AGU	
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Client Sample ID: W9-daily comp-081812

Lab Sample ID: 440-22022-6

Date Collected: 08/29/12 14:40

Matrix: Solid

Date Received: 08/30/12 09:40

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7471A			0.51 g	50 mL	50151	09/06/12 12:40	SN	TAL IRV
Total/NA	Analysis	7471A		1			50328	09/06/12 22:36	DB	TAL IRV
Total/NA	Prep	3050B			2.03 g	50 mL	50409	09/07/12 09:09	DT	TAL IRV
Total/NA	Analysis	6020		20			50607	09/07/12 18:02	YS	TAL IRV
Total/NA	Analysis	6020		20			50849	09/07/12 20:13	RC	TAL IRV
Total/NA	Analysis	6020		200			50849	09/07/12 20:18	RC	TAL IRV
Total/NA	Prep	NA		1			2970998_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2970998	09/15/12 00:00	KKS	
Total/NA	Prep	NA		1			2973209_P	09/07/12 00:00		
Total/NA	Analysis	EPA 8290 mod.		1			2973209	09/18/12 00:00	AGU	
Total/NA	Analysis	R.Carter,1993		1			2960576	09/05/12 00:00		
Total/NA	Prep	NA		1			2960576_P	09/05/12 00:00		

Laboratory References:

= , , ,

Maxxam = Maxxam Analytics Inc., PO BOX 57437, Postal Station A, Toronto, Ontario M5W 5M5

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-22022-1

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-50409/1-A ^20
Matrix: Solid
Analysis Batch: 50607

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 50409

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Arsenic	ND		0.49	0.44	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Barium	ND		0.49	0.15	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Beryllium	ND		0.30	0.049	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Cadmium	ND		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Chromium	ND		0.99	0.39	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Cobalt	ND		0.49	0.049	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Nickel	ND		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Selenium	ND		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Thallium	ND		0.49	0.099	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Vanadium	ND		0.99	0.39	mg/Kg		09/07/12 09:09	09/07/12 17:28	20
Zinc	ND		9.9	2.0	mg/Kg		09/07/12 09:09	09/07/12 17:28	20

Lab Sample ID: MB 440-50409/1-A ^20
Matrix: Solid
Analysis Batch: 50849

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 50409

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Copper	ND		0.99	0.25	mg/Kg		09/07/12 09:09	09/07/12 19:25	20
Lead	ND		0.49	0.099	mg/Kg		09/07/12 09:09	09/07/12 19:25	20
Molybdenum	ND		0.99	0.099	mg/Kg		09/07/12 09:09	09/07/12 19:25	20
Antimony	ND		0.99	0.15	mg/Kg		09/07/12 09:09	09/07/12 19:25	20

Lab Sample ID: LCS 440-50409/2-A ^20
Matrix: Solid
Analysis Batch: 50607

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 50409

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	25.1	26.3		mg/Kg		105	80 - 120
Arsenic	50.3	49.3		mg/Kg		98	80 - 120
Barium	50.3	50.2		mg/Kg		100	80 - 120
Beryllium	50.3	48.0		mg/Kg		96	80 - 120
Cadmium	50.3	47.9		mg/Kg		95	80 - 120
Chromium	50.3	50.0		mg/Kg		99	80 - 120
Cobalt	50.3	48.9		mg/Kg		97	80 - 120
Nickel	50.3	46.7		mg/Kg		93	80 - 120
Selenium	50.3	47.4		mg/Kg		94	80 - 120
Thallium	50.3	49.2		mg/Kg		98	80 - 120
Vanadium	50.3	49.1		mg/Kg		98	80 - 120
Zinc	50.3	46.3		mg/Kg		92	80 - 120

Lab Sample ID: LCS 440-50409/2-A ^20
Matrix: Solid
Analysis Batch: 50849

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 50409

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	50.3	47.2		mg/Kg		94	80 - 120
Lead	50.3	46.6		mg/Kg		93	80 - 120
Molybdenum	50.3	46.1		mg/Kg		92	80 - 120
Antimony	50.3	46.8		mg/Kg		93	80 - 120

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 440-22022-1 MS — **Client Sample ID: W9-daily comp-081312**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 50607 — **Prep Batch: 50409**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	4.7		24.8	27.9		mg/Kg		94	80 - 120
Arsenic	1.4		49.5	44.2		mg/Kg		87	80 - 120
Barium	400		49.5	447	4	mg/Kg		85	80 - 120
Beryllium	0.23	J	49.5	44.0		mg/Kg		88	80 - 120
Cadmium	6.7		49.5	47.8		mg/Kg		83	80 - 120
Chromium	27		49.5	68.9		mg/Kg		85	80 - 120
Cobalt	5.2		49.5	46.3		mg/Kg		83	80 - 120
Nickel	29		49.5	74.2		mg/Kg		91	80 - 120
Selenium	ND		49.5	36.9	F	mg/Kg		75	80 - 120
Thallium	ND		49.5	29.7	F	mg/Kg		60	80 - 120
Vanadium	6.1		49.5	49.0		mg/Kg		87	80 - 120

Lab Sample ID: 440-22022-1 MS — **Client Sample ID: W9-daily comp-081312**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 50849 — **Prep Batch: 50409**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	200		49.5	241		mg/Kg		89	80 - 120
Lead	94		49.5	131	F	mg/Kg		75	80 - 120
Molybdenum	11		49.5	47.4	F	mg/Kg		73	80 - 120
Antimony	74		49.5	93.5	F	mg/Kg		39	80 - 120

Lab Sample ID: 440-22022-1 MS — **Client Sample ID: W9-daily comp-081312**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 50849 — **Prep Batch: 50409**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Zinc	2000		49.5	1890	4	mg/Kg		-132	80 - 120

Lab Sample ID: 440-22022-1 MSD — **Client Sample ID: W9-daily comp-081312**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 50607 — **Prep Batch: 50409**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Silver	4.7		25.0	26.7		mg/Kg		88	80 - 120	4	20
Arsenic	1.4		50.0	41.9		mg/Kg		81	80 - 120	5	20
Barium	400		50.0	430	4	mg/Kg		51	80 - 120	4	20
Beryllium	0.23	J	50.0	41.8		mg/Kg		83	80 - 120	5	20
Cadmium	6.7		50.0	45.6	F	mg/Kg		78	80 - 120	5	20
Chromium	27		50.0	65.8	F	mg/Kg		78	80 - 120	5	20
Cobalt	5.2		50.0	44.4	F	mg/Kg		78	80 - 120	4	20
Nickel	29		50.0	70.2		mg/Kg		82	80 - 120	5	20
Selenium	ND		50.0	35.3	F	mg/Kg		71	80 - 120	4	20
Thallium	ND		50.0	28.2	F	mg/Kg		56	80 - 120	5	20
Vanadium	6.1		50.0	46.8		mg/Kg		81	80 - 120	5	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: 440-22022-1 MSD
Client Sample ID: W9-daily comp-081312
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50849
Prep Batch: 50409

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Copper	200		50.0	243		mg/Kg		93	80 - 120	1	20
Lead	94		50.0	136		mg/Kg		84	80 - 120	4	20
Molybdenum	11		50.0	49.9	F	mg/Kg		77	80 - 120	5	20
Antimony	74		50.0	99.1	F	mg/Kg		50	80 - 120	6	20

Lab Sample ID: 440-22022-1 MSD
Client Sample ID: W9-daily comp-081312
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50849
Prep Batch: 50409

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Zinc	2000		50.0	2010	4	mg/Kg		111	80 - 120	6	20

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-50150/1-A
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50454
Prep Batch: 50150

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		09/06/12 12:45	09/06/12 23:59	1

Lab Sample ID: LCS 440-50150/2-A
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50454
Prep Batch: 50150

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.720		mg/Kg		90	80 - 120

Lab Sample ID: MB 440-50151/1-A
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50328
Prep Batch: 50151

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		09/06/12 12:40	09/06/12 21:54	1

Lab Sample ID: LCS 440-50151/2-A
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 50328
Prep Batch: 50151

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.810		mg/Kg		101	80 - 120

Method: EPA 8290 mod. - EPA 8290 mod.

Lab Sample ID: 2970998-BLK
Client Sample ID: Method Blank
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 2970998
Prep Batch: 2970998_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	2.41	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2970998-BLK
Matrix: Soil
Analysis Batch: 2970998

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2970998_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDF	ND		40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	1.2	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND		40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,6,7,8-Hexa CDD	ND		40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,6,7,8-Hexa CDF	2.26	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,7,8,9-Hexa CDD	1.4	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,7,8-Penta CDD	1.45	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
1,2,3,7,8-Penta CDF	2.58	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
2,3,4,6,7,8-Hexa CDF	2.9	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
2,3,4,7,8-Penta CDF	2	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
2,3,7,8-Tetra CDD	2.07	J	16		pg/g		09/05/12 00:00	09/05/12 00:00	1
2,3,7,8-Tetra CDF	ND	A1918	16		pg/g		09/05/12 00:00	09/05/12 00:00	1
Octa CDD	8.3	J	80		pg/g		09/05/12 00:00	09/05/12 00:00	1
Octa CDF	ND	A1919	80		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Hepta CDD	2.41	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Hepta CDF	1.2	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Hexa CDD	1.4	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Hexa CDF	5.16	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Penta CDD	1.45	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Penta CDF	7.71	J	40		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Tetra CDD	2.07	J	16		pg/g		09/05/12 00:00	09/05/12 00:00	1
Total Tetra CDF	5.89	J	16		pg/g		09/05/12 00:00	09/05/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*83*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-1234678 HeptaCDF	*78*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-123478 HexaCDF	*77*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-123678 HexaCDD	*78*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-12378 PentaCDD	*97*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-12378 PentaCDF	*82*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-2378 TetraCDD	*92*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-2378 TetraCDF	*75*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*
C13-OCDD	*77*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*

Lab Sample ID: 2970998-LCS
Matrix: Soil
Analysis Batch: 2970998

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 2970998_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,4,6,7,8-Hepta CDD	100	84		pg/g		84	80 - 140
1,2,3,4,6,7,8-Hepta CDF	100	90		pg/g		90	80 - 140
1,2,3,4,7,8,9-Hepta CDF	100	93		pg/g		93	80 - 140
1,2,3,4,7,8-Hexa CDD	100	100		pg/g		100	80 - 140
1,2,3,4,7,8-Hexa CDF	100	92		pg/g		92	80 - 140
1,2,3,6,7,8-Hexa CDD	100	99		pg/g		99	80 - 140
1,2,3,6,7,8-Hexa CDF	100	97		pg/g		97	80 - 140
1,2,3,7,8,9-Hexa CDD	100	102		pg/g		102	80 - 140

Method: EPA 8290 mod. - EPA 8290 mod. (Continued)

Lab Sample ID: 2970998-LCS
Client Sample ID: Lab Control Sample
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 2970998
Prep Batch: 2970998_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,7,8,9-Hexa CDF	100	97		pg/g		97	80 - 140
1,2,3,7,8-Penta CDD	100	89		pg/g		89	80 - 140
1,2,3,7,8-Penta CDF	100	94		pg/g		94	80 - 140
2,3,4,6,7,8-Hexa CDF	100	96		pg/g		96	80 - 140
2,3,4,7,8-Penta CDF	100	103		pg/g		103	80 - 140
2,3,7,8-Tetra CDD	100	88		pg/g		88	80 - 140
2,3,7,8-Tetra CDF	100	84		pg/g		84	80 - 140
Octa CDD	100	94		pg/g		94	80 - 140
Octa CDF	100	96		pg/g		96	80 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
C13-1234678 HeptaCDD	*90*		*40 - 135*
C13-1234678 HeptaCDF	*83*		*40 - 135*
C13-123478 HexaCDF	*81*		*40 - 135*
C13-123678 HexaCDD	*85*		*40 - 135*
C13-12378 PentaCDD	*114*		*40 - 135*
C13-12378 PentaCDF	*92*		*40 - 135*
C13-2378 TetraCDD	*104*		*40 - 135*
C13-2378 TetraCDF	*88*		*40 - 135*
C13-OCDD	*88*		*40 - 135*

Lab Sample ID: 2973209-BLK
Client Sample ID: Method Blank
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 2973209
Prep Batch: 2973209_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND		8		pg/g		09/05/12 00:00	09/05/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-2378 TetraCDF	*87*		*40 - 135*	*09/05/12 00:00*	*09/05/12 00:00*	*1*

1 2 3 4 5 6 7 8 9 10 11 12 13

Metals

Prep Batch: 50150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-daily comp-081312	Total/NA	Solid	7471A	
440-22022-2	W9-daily comp-081412	Total/NA	Solid	7471A	
440-22022-3	W9-daily comp-081512	Total/NA	Solid	7471A	
440-22022-4	W9-daily comp-081612	Total/NA	Solid	7471A	
440-22022-5	W9-daily comp-081712	Total/NA	Solid	7471A	
LCS 440-50150/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-50150/1-A	Method Blank	Total/NA	Solid	7471A	

Prep Batch: 50151

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-6	W9-daily comp-081812	Total/NA	Solid	7471A	
LCS 440-50151/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-50151/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 50328

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-6	W9-daily comp-081812	Total/NA	Solid	7471A	50151
LCS 440-50151/2-A	Lab Control Sample	Total/NA	Solid	7471A	50151
MB 440-50151/1-A	Method Blank	Total/NA	Solid	7471A	50151

Prep Batch: 50409

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-daily comp-081312	Total/NA	Solid	3050B	
440-22022-1 MS	W9-daily comp-081312	Total/NA	Solid	3050B	
440-22022-1 MSD	W9-daily comp-081312	Total/NA	Solid	3050B	
440-22022-2	W9-daily comp-081412	Total/NA	Solid	3050B	
440-22022-3	W9-daily comp-081512	Total/NA	Solid	3050B	
440-22022-4	W9-daily comp-081612	Total/NA	Solid	3050B	
440-22022-5	W9-daily comp-081712	Total/NA	Solid	3050B	
440-22022-6	W9-daily comp-081812	Total/NA	Solid	3050B	
LCS 440-50409/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-50409/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 50454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-daily comp-081312	Total/NA	Solid	7471A	50150
440-22022-2	W9-daily comp-081412	Total/NA	Solid	7471A	50150
440-22022-3	W9-daily comp-081512	Total/NA	Solid	7471A	50150
440-22022-4	W9-daily comp-081612	Total/NA	Solid	7471A	50150
440-22022-5	W9-daily comp-081712	Total/NA	Solid	7471A	50150
LCS 440-50150/2-A	Lab Control Sample	Total/NA	Solid	7471A	50150
MB 440-50150/1-A	Method Blank	Total/NA	Solid	7471A	50150

Analysis Batch: 50607

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MS	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MSD	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-2	W9-daily comp-081412	Total/NA	Solid	6020	50409
440-22022-3	W9-daily comp-081512	Total/NA	Solid	6020	50409
440-22022-4	W9-daily comp-081612	Total/NA	Solid	6020	50409
440-22022-5	W9-daily comp-081712	Total/NA	Solid	6020	50409

Metals (Continued)

Analysis Batch: 50607 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-6	W9-daily comp-081812	Total/NA	Solid	6020	50409
LCS 440-50409/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	50409
MB 440-50409/1-A ^20	Method Blank	Total/NA	Solid	6020	50409

Analysis Batch: 50849

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MS	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MS	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MSD	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-1 MSD	W9-daily comp-081312	Total/NA	Solid	6020	50409
440-22022-2	W9-daily comp-081412	Total/NA	Solid	6020	50409
440-22022-3	W9-daily comp-081512	Total/NA	Solid	6020	50409
440-22022-4	W9-daily comp-081612	Total/NA	Solid	6020	50409
440-22022-4	W9-daily comp-081612	Total/NA	Solid	6020	50409
440-22022-5	W9-daily comp-081712	Total/NA	Solid	6020	50409
440-22022-5	W9-daily comp-081712	Total/NA	Solid	6020	50409
440-22022-6	W9-daily comp-081812	Total/NA	Solid	6020	50409
440-22022-6	W9-daily comp-081812	Total/NA	Solid	6020	50409
LCS 440-50409/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	50409
MB 440-50409/1-A ^20	Method Blank	Total/NA	Solid	6020	50409

Subcontract

Analysis Batch: 2960576

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	R.Carter,1993	2960576_P
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	R.Carter,1993	2960576_P
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	R.Carter,1993	2960576_P
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	R.Carter,1993	2960576_P
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	R.Carter,1993	2960576_P
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	R.Carter,1993	2960576_P

Analysis Batch: 2970998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2970998-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2970998_P
2970998-LCS	Lab Control Sample	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	EPA 8290 mod.	2970998_P

Analysis Batch: 2973209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2973209-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	2973209_P
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P

Subcontract (Continued)

Analysis Batch: 2973209 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	EPA 8290 mod.	2973209_P

Prep Batch: 2960576_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	NA	
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	NA	
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	NA	
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	NA	
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	NA	
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	NA	

Prep Batch: 2970998_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2970998-BLK	Method Blank	Total/NA	Soil	NA	
2970998-LCS	Lab Control Sample	Total/NA	Soil	NA	
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	NA	
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	NA	
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	NA	
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	NA	
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	NA	
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	NA	

Prep Batch: 2973209_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2973209-BLK	Method Blank	Total/NA	Soil	NA	
440-22022-1	W9-DAILY COMP-081312 (440	Total/NA	Soil	NA	
440-22022-2	W9-DAILY COMP-081412 (440	Total/NA	Soil	NA	
440-22022-3	W9-DAILY COMP-081512 (440	Total/NA	Soil	NA	
440-22022-4	W9-DAILY COMP-081612 (440	Total/NA	Soil	NA	
440-22022-5	W9-DAILY COMP-081712 (440	Total/NA	Soil	NA	
440-22022-6	W9-DAILY COMP-081812 (440	Total/NA	Soil	NA	

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
F	MS or MSD exceeds the control limits

Subcontract

Qualifier	Qualifier Description
J	Estimated concentration between the EDL and RDL
A1913	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A1911	RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
A1885	EMPC / Merged Peak
A1918	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
A1919	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds. RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: JT3 LLC

TestAmerica Job ID: 440-22022-1

Project/Site: Waste to Energy

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-12
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	09-30-12
New Mexico	State Program	6	N/A	01-31-12
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14

Success Through Science®

Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: NA

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/09/18

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2D4628
Received: 2012/09/01, 10:30

Sample Matrix: Soil
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (8290) (1)	6	2012/09/07	2012/09/15	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	1	N/A	2012/09/10	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	4	N/A	2012/09/17	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	1	N/A	2012/09/18	BRL SOP-00406	EPA 8290 mod.
Moisture	6	N/A	2012/09/05	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

1 2 3 4 5 6 7 8 9 10 11 12 13

Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: NA

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/09/18

CERTIFICATE OF ANALYSIS

-2-

Maxxam Analytics Inc. Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section.

Total cover pages: 2

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		OS0348	OS0349	OS0350	OS0351	OS0352		
Sampling Date		2012/08/29 13:55	2012/08/29 14:05	2012/08/29 14:15	2012/08/29 14:30	2012/08/29 14:35		
COC Number		NA	NA	NA	NA	NA		
	Units	**W9-DAILY COMP-081312 (440-22022-1)**	**W9-DAILY COMP-081412 (440-22022-2)**	**W9-DAILY COMP-081512 (440-22022-3)**	**W9-DAILY COMP-081612 (440-22022-4)**	**W9-DAILY COMP-081712 (440-22022-5)**	**QC Batch**	**RDL**
Moisture	%	0.040 U	0.20 J	0.20 J	0.040 U	0.040 U	2960576	1.0

QC Batch = Quality Control Batch

Maxxam ID		OS0353		
Sampling Date		2012/08/29 14:40		
COC Number		NA		
	Units	**W9-DAILY COMP-081812 (440-22022-6)**	**QC Batch**	**RDL**
Moisture	%	0.20 J	2960576	1.0

QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0348						
Sampling Date		2012/08/29 13:55						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	W9-DAILY COMP-081312 (440-22022-1)	EDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	RDL
2,3,7,8-Tetra CDD *	pg/g	1.7 J	1.2	1.00	1.70		2970998	20
1,2,3,7,8-Penta CDD	pg/g	1.7 J	1.1	1.00	1.70		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	1.4 U	1.4	0.100	0.140		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	1.6 J	1.2	0.100	0.160		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	1.3 U (1)	1.3	0.100	0.130		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	14.3 J	1.1	0.0100	0.143		2970998	50
Octa CDD	pg/g	77.6 J	1.4	0.000300	0.0233		2970998	100
Total Tetra CDD	pg/g	16.3 J	1.2				2970998	20
Total Penta CDD	pg/g	9.2 J	1.1				2970998	50
Total Hexa CDD	pg/g	7.4 J	1.3				2970998	50
Total Hepta CDD	pg/g	24.2 J	1.1				2970998	50
2,3,7,8-Tetra CDF **	pg/g	25	1.0	0.100	2.50		2970998	20
1,2,3,7,8-Penta CDF	pg/g	5.2 J	1.2	0.0300	0.156		2970998	50
2,3,4,7,8-Penta CDF	pg/g	6.7 J	1.2	0.300	2.01		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	2.6 U (1)	2.6	0.100	0.260		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	4.3 J	1.1	0.100	0.430		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	4.8 J	1.2	0.100	0.480		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	1.4 U	1.4	0.100	0.140		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	9.1 U (1)	9.1	0.0100	0.0910		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	1.4 U	1.4	0.0100	0.0140		2970998	50
Octa CDF	pg/g	9.8 J	2.6	0.000300	0.00294		2970998	100
Total Tetra CDF	pg/g	181	1.0				2970998	20
Total Penta CDF	pg/g	61	1.2				2970998	50
Total Hexa CDF	pg/g	23.9 J	1.2				2970998	50
Total Hepta CDF	pg/g	10 U (1)	10				2970998	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	8.0 J	1.3	0.100	0.800		2973209	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				8.38			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0348						
Sampling Date		2012/08/29 13:55						
COC Number		NA		**TOXIC EQUIVALENCY**		**# of**		
	Units	**W9-DAILY COMP-081312 (440-22022-1)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	59					2970998	
C13-1234678 HeptaCDF **	%	57					2970998	
C13-123478 HexaCDF	%	57					2970998	
C13-123678 HexaCDD	%	59					2970998	
C13-12378 PentaCDD	%	74					2970998	
C13-12378 PentaCDF	%	62					2970998	
C13-2378 TetraCDD	%	74					2970998	
C13-2378 TetraCDF	%	63					2970998	
C13-OCDD	%	58					2970998	
Confirmation C13-2378 TetraCDF	%	73					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0349						
Sampling Date		2012/08/29 14:05						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081412 (440-22022-2)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	5.4 J	1.0	1.00	5.40		2970998	20
1,2,3,7,8-Penta CDD	pg/g	4.9 J	1.0	1.00	4.90		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	2.2 J	1.1	0.100	0.220		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	3.18 J	0.94	0.100	0.318		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	5.80 J	0.98	0.100	0.580		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	12.4 J	1.2	0.0100	0.124		2970998	50
Octa CDD	pg/g	24 U (1)	24	0.000300	0.00720		2970998	100
Total Tetra CDD	pg/g	46	1.0				2970998	20
Total Penta CDD	pg/g	27.4 J	1.0				2970998	50
Total Hexa CDD	pg/g	37.1 J	1.0				2970998	50
Total Hepta CDD	pg/g	22.1 J	1.2				2970998	50
2,3,7,8-Tetra CDF **	pg/g	300	1.1	0.100	30.0		2970998	20
1,2,3,7,8-Penta CDF	pg/g	44.1 J	1.1	0.0300	1.32		2970998	50
2,3,4,7,8-Penta CDF	pg/g	51	1.1	0.300	15.3		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	17.7 J	1.1	0.100	1.77		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	25.2 J	1.1	0.100	2.52		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	22.7 J	1.2	0.100	2.27		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	3.0 J	1.3	0.100	0.300		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	33.0 J	0.93	0.0100	0.330		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	8.4 J	1.2	0.0100	0.0840		2970998	50
Octa CDF	pg/g	11.1 J	1.5	0.000300	0.00333		2970998	100
Total Tetra CDF	pg/g	1910	1.1				2970998	20
Total Penta CDF	pg/g	586	1.1				2970998	50
Total Hexa CDF	pg/g	186	1.1				2970998	50
Total Hepta CDF	pg/g	54	1.1				2970998	50

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

1 2 3 4 5 6 7 8 9 10 11 12 13

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0349						
Sampling Date		2012/08/29 14:05						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081412 (440-22022-2)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Confirmation 2,3,7,8-Tetra CDF **	pg/g	62.4	1.8	0.100	6.24		2973209	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				41.7			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	85					2970998	
C13-1234678 HeptaCDF	%	81					2970998	
C13-123478 HexaCDF	%	78					2970998	
C13-123678 HexaCDD	%	83					2970998	
C13-12378 PentaCDD	%	99					2970998	
C13-12378 PentaCDF	%	84					2970998	
C13-2378 TetraCDD	%	102					2970998	
C13-2378 TetraCDF	%	86					2970998	
C13-OCDD	%	78					2970998	
Confirmation C13-2378 TetraCDF	%	100					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0350						
Sampling Date		2012/08/29 14:15						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081512 (440-22022-3)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	12.3 J	1.1	1.00	12.3		2970998	20
1,2,3,7,8-Penta CDD	pg/g	15.7 J	1.1	1.00	15.7		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	6.1 J	1.1	0.100	0.610		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	7.97 J	0.97	0.100	0.797		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	10 U (1)	10	0.100	1.00		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	32.0 J	1.1	0.0100	0.320		2970998	50
Octa CDD	pg/g	85.8 J	1.3	0.000300	0.0257		2970998	100
Total Tetra CDD	pg/g	370	1.1				2970998	20
Total Penta CDD	pg/g	177	1.1				2970998	50
Total Hexa CDD	pg/g	85	1.0				2970998	50
Total Hepta CDD	pg/g	56	1.1				2970998	50
2,3,7,8-Tetra CDF **	pg/g	1320	1.0	0.100	132		2970998	20
1,2,3,7,8-Penta CDF	pg/g	214	1.1	0.0300	6.42		2970998	50
2,3,4,7,8-Penta CDF	pg/g	279	1.1	0.300	83.7		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	139	0.98	0.100	13.9		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	139	0.98	0.100	13.9		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	112	1.1	0.100	11.2		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	16.0 J	1.2	0.100	1.60		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	163	0.93	0.0100	1.63		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	48.3 J	1.2	0.0100	0.483		2970998	50
Octa CDF	pg/g	73.4 J	1.2	0.000300	0.0220		2970998	100
Total Tetra CDF	pg/g	8410	1.0				2970998	20
Total Penta CDF	pg/g	3400	1.1				2970998	50
Total Hexa CDF	pg/g	1150	1.1				2970998	50
Total Hepta CDF	pg/g	301	1.1				2970998	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	236	2.9	0.100	23.6		2973209	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				187			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0350						
Sampling Date		2012/08/29 14:15						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081512 (440-22022-3)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	73					2970998	
C13-1234678 HeptaCDF **	%	70					2970998	
C13-123478 HexaCDF	%	72					2970998	
C13-123678 HexaCDD	%	75					2970998	
C13-12378 PentaCDD	%	88					2970998	
C13-12378 PentaCDF	%	76					2970998	
C13-2378 TetraCDD	%	92					2970998	
C13-2378 TetraCDF	%	77					2970998	
C13-OCDD	%	67					2970998	
Confirmation C13-2378 TetraCDF	%	91					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0351						
Sampling Date		2012/08/29 14:30						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081612 (440-22022-4)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	73	1.0	1.00	73.0		2970998	20
1,2,3,7,8-Penta CDD	pg/g	265	0.99	1.00	265		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	216	1.2	0.100	21.6		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	272	1.1	0.100	27.2		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	348	1.1	0.100	34.8		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	1650	1.1	0.0100	16.5		2970998	50
Octa CDD	pg/g	2220	1.2	0.000300	0.666		2970998	100
Total Tetra CDD	pg/g	2320	1.0				2970998	20
Total Penta CDD	pg/g	2940	0.99				2970998	50
Total Hexa CDD	pg/g	3900	1.1				2970998	50
Total Hepta CDD	pg/g	2940	1.1				2970998	50
2,3,7,8-Tetra CDF **	pg/g	6590	1.1	0.100	659		2970998	20
1,2,3,7,8-Penta CDF	pg/g	1720	1.0	0.0300	51.6		2970998	50
2,3,4,7,8-Penta CDF	pg/g	2850	1.0	0.300	855		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	3110	1.1	0.100	311		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	2180	1.1	0.100	218		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	2270	1.2	0.100	227		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	78	1.4	0.100	7.80		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	5740	0.94	0.0100	57.4		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	557	1.2	0.0100	5.57		2970998	50
Octa CDF	pg/g	1540	1.3	0.000300	0.462		2970998	100
Total Tetra CDF	pg/g	40100	1.1				2970998	20
Total Penta CDF	pg/g	32900	1.0				2970998	50
Total Hexa CDF	pg/g	20000	1.2				2970998	50
Total Hepta CDF	pg/g	8140	1.1				2970998	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	1230	2.4	0.100	123		2973209	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				2300			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0351						
Sampling Date		2012/08/29 14:30						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081612 (440-22022-4)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**

Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	71					2970998	
C13-1234678 HeptaCDF **	%	67					2970998	
C13-123478 HexaCDF	%	66					2970998	
C13-123678 HexaCDD	%	68					2970998	
C13-12378 PentaCDD	%	77					2970998	
C13-12378 PentaCDF	%	69					2970998	
C13-2378 TetraCDD	%	84					2970998	
C13-2378 TetraCDF	%	74					2970998	
C13-OCDD	%	67					2970998	
Confirmation C13-2378 TetraCDF	%	83					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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1 2 3 4 5 6 7 8 9 10 11 12 13

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0352						
Sampling Date		2012/08/29 14:35						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081712 (440-22022-5)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	17.3 J	1.1	1.00	17.3		2970998	20
1,2,3,7,8-Penta CDD	pg/g	16.2 J	1.0	1.00	16.2		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	9.8 J	1.2	0.100	0.980		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	11.4 J	1.0	0.100	1.14		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	10 U (1)	10	0.100	1.00		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	58	1.1	0.0100	0.580		2970998	50
Octa CDD	pg/g	54.0 J	1.4	0.000300	0.0162		2970998	100
Total Tetra CDD	pg/g	522	1.1				2970998	20
Total Penta CDD	pg/g	219	1.0				2970998	50
Total Hexa CDD	pg/g	170	1.1				2970998	50
Total Hepta CDD	pg/g	99	1.1				2970998	50
2,3,7,8-Tetra CDF **	pg/g	755	1.0	0.100	75.5		2970998	20
1,2,3,7,8-Penta CDF	pg/g	102	1.1	0.0300	3.06		2970998	50
2,3,4,7,8-Penta CDF	pg/g	125	1.1	0.300	37.5		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	125	1.0	0.100	12.5		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	59	1.0	0.100	5.90		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	57	1.2	0.100	5.70		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	2.8 J	1.3	0.100	0.280		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	103	0.98	0.0100	1.03		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	17.4 J	1.3	0.0100	0.174		2970998	50
Octa CDF	pg/g	32.1 J	1.4	0.000300	0.00963		2970998	100
Total Tetra CDF	pg/g	5930	1.0				2970998	20
Total Penta CDF	pg/g	1600	1.1				2970998	50
Total Hexa CDF	pg/g	502	1.1				2970998	50
Total Hepta CDF	pg/g	165	1.1				2970998	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	234	2.5	0.100	23.4		2973209	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				127			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0352						
Sampling Date		2012/08/29 14:35						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081712 (440-22022-5)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	74					2970998	
C13-1234678 HeptaCDF **	%	69					2970998	
C13-123478 HexaCDF	%	69					2970998	
C13-123678 HexaCDD	%	72					2970998	
C13-12378 PentaCDD	%	82					2970998	
C13-12378 PentaCDF	%	72					2970998	
C13-2378 TetraCDD	%	86					2970998	
C13-2378 TetraCDF	%	76					2970998	
C13-OCDD	%	68					2970998	
Confirmation C13-2378 TetraCDF	%	81					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0353						
Sampling Date		2012/08/29 14:40						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081812 (440-22022-6)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	31	0.96	1.00	31.0		2970998	20
1,2,3,7,8-Penta CDD	pg/g	85 U (1)	85	1.00	85.0		2970998	50
1,2,3,4,7,8-Hexa CDD	pg/g	89	1.2	0.100	8.90		2970998	50
1,2,3,6,7,8-Hexa CDD	pg/g	97	1.1	0.100	9.70		2970998	50
1,2,3,7,8,9-Hexa CDD	pg/g	277 (2)	1.1	0.100	27.7		2970998	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	730	0.81	0.0100	7.30		2970998	50
Octa CDD	pg/g	1950	1.9	0.000300	0.585		2970998	100
Total Tetra CDD	pg/g	456	0.96				2970998	20
Total Penta CDD	pg/g	555	0.97				2970998	50
Total Hexa CDD	pg/g	1110	1.1				2970998	50
Total Hepta CDD	pg/g	1350	0.81				2970998	50
2,3,7,8-Tetra CDF **	pg/g	2450	1.0	0.100	245		2970998	20
1,2,3,7,8-Penta CDF	pg/g	533	1.5	0.0300	16.0		2970998	50
2,3,4,7,8-Penta CDF	pg/g	759	1.5	0.300	228		2970998	50
1,2,3,4,7,8-Hexa CDF	pg/g	2340 (2)	0.98	0.100	234		2970998	50
1,2,3,6,7,8-Hexa CDF	pg/g	716	0.99	0.100	71.6		2970998	50
2,3,4,6,7,8-Hexa CDF	pg/g	1010	1.1	0.100	101		2970998	50
1,2,3,7,8,9-Hexa CDF	pg/g	36.0 J	1.2	0.100	3.60		2970998	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	3490	1.2	0.0100	34.9		2970998	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	282	1.5	0.0100	2.82		2970998	50
Octa CDF	pg/g	1960	1.3	0.000300	0.588		2970998	100
Total Tetra CDF	pg/g	14600	1.0				2970998	20
Total Penta CDF	pg/g	11800	1.5				2970998	50
Total Hexa CDF	pg/g	8000	1.1				2970998	50
Total Hepta CDF	pg/g	5090	1.3				2970998	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	348	4.4	0.100	34.8		2973209	N/A

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
(2) EMPC / Merged Peak

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1 2 3 4 5 6 7 8 9 10 11 12 13

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		OS0353						
Sampling Date		2012/08/29 14:40						
COC Number		NA		TOXIC EQUIVALENCY		# of		
	Units	**W9-DAILY COMP-081812 (440-22022-6)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
TOTAL TOXIC EQUIVALENCY	pg/g				897			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	78					2970998	
C13-1234678 HeptaCDF **	%	75					2970998	
C13-123478 HexaCDF	%	76					2970998	
C13-123678 HexaCDD	%	78					2970998	
C13-12378 PentaCDD	%	97					2970998	
C13-12378 PentaCDF	%	80					2970998	
C13-2378 TetraCDD	%	98					2970998	
C13-2378 TetraCDF	%	82					2970998	
C13-OCDD	%	75					2970998	
Confirmation C13-2378 TetraCDF	%	96					2973209	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

Test Summary

Maxxam ID OS0348 **Collected** 2012/08/29
Sample ID W9-DAILY COMP-081312 (440-22022-1) **Shipped**
Matrix Soil **Received** 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/17	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

Maxxam ID OS0349 **Collected** 2012/08/29
Sample ID W9-DAILY COMP-081412 (440-22022-2) **Shipped**
Matrix Soil **Received** 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/17	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

Maxxam ID OS0350 **Collected** 2012/08/29
Sample ID W9-DAILY COMP-081512 (440-22022-3) **Shipped**
Matrix Soil **Received** 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/17	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

Maxxam ID OS0351 **Collected** 2012/08/29
Sample ID W9-DAILY COMP-081612 (440-22022-4) **Shipped**
Matrix Soil **Received** 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/17	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

Maxxam ID OS0352 **Collected** 2012/08/29
Sample ID W9-DAILY COMP-081712 (440-22022-5) **Shipped**
Matrix Soil **Received** 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/10	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

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Maxxam Job #: B2D4628
Report Date: 2012/09/18

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

Test Summary

Maxxam ID OS0353
Sample ID W9-DAILY COMP-081812 (440-22022-6)
Matrix Soil

Collected 2012/08/29
Shipped
Received 2012/09/01

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2970998	2012/09/07	2012/09/15	Kay Shaw
2378TCDF Confirmation in Soil	HRMS/MS	2973209	N/A	2012/09/18	Angel Guerrero
Moisture	BAL	2960576	N/A	2012/09/05	Valentina Kaftani

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GENERAL COMMENTS

Results reported on a wet weight basis as per client request

Results relate only to the items tested.

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report
Maxxam Job Number: GB2D4628

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2960576 THT	RPD - Sample/Sample Dup	Moisture	2012/09/05	2.2		%	20
2970998 KKS	Spiked Blank	C13-1234678 HeptaCDD	2012/09/14		90	%	40 - 135
		C13-1234678 HeptaCDF	2012/09/14		83	%	40 - 135
		C13-123478 HexaCDF	2012/09/14		81	%	40 - 135
		C13-123678 HexaCDD	2012/09/14		85	%	40 - 135
		C13-12378 PentaCDD	2012/09/14		114	%	40 - 135
		C13-12378 PentaCDF	2012/09/14		92	%	40 - 135
		C13-2378 TetraCDD	2012/09/14		104	%	40 - 135
		C13-2378 TetraCDF	2012/09/14		88	%	40 - 135
		C13-OCDD	2012/09/14		88	%	40 - 135
		2,3,7,8-Tetra CDD	2012/09/14		88	%	80 - 140
		1,2,3,7,8-Penta CDD	2012/09/14		89	%	80 - 140
		1,2,3,4,7,8-Hexa CDD	2012/09/14		100	%	80 - 140
		1,2,3,6,7,8-Hexa CDD	2012/09/14		99	%	80 - 140
		1,2,3,7,8,9-Hexa CDD	2012/09/14		102	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDD	2012/09/14		84	%	80 - 140
		Octa CDD	2012/09/14		94	%	80 - 140
		2,3,7,8-Tetra CDF	2012/09/14		84	%	80 - 140
		1,2,3,7,8-Penta CDF	2012/09/14		94	%	80 - 140
		2,3,4,7,8-Penta CDF	2012/09/14		103	%	80 - 140
		1,2,3,4,7,8-Hexa CDF	2012/09/14		92	%	80 - 140
		1,2,3,6,7,8-Hexa CDF	2012/09/14		97	%	80 - 140
		2,3,4,6,7,8-Hexa CDF	2012/09/14		96	%	80 - 140
		1,2,3,7,8,9-Hexa CDF	2012/09/14		97	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDF	2012/09/14		90	%	80 - 140
		1,2,3,4,7,8,9-Hepta CDF	2012/09/14		93	%	80 - 140
		Octa CDF	2012/09/14		96	%	80 - 140
	Method Blank	C13-1234678 HeptaCDD	2012/09/14		83	%	40 - 135
		C13-1234678 HeptaCDF	2012/09/14		78	%	40 - 135
		C13-123478 HexaCDF	2012/09/14		77	%	40 - 135
		C13-123678 HexaCDD	2012/09/14		78	%	40 - 135
		C13-12378 PentaCDD	2012/09/14		97	%	40 - 135
		C13-12378 PentaCDF	2012/09/14		82	%	40 - 135
		C13-2378 TetraCDD	2012/09/14		92	%	40 - 135
		C13-2378 TetraCDF	2012/09/14		75	%	40 - 135
		C13-OCDD	2012/09/14		77	%	40 - 135
		2,3,7,8-Tetra CDD	2012/09/14	2.07 J, EDL=0.94		pg/g	
		1,2,3,7,8-Penta CDD	2012/09/14	1.45 J, EDL=0.92		pg/g	
		1,2,3,4,7,8-Hexa CDD	2012/09/14	0.98 U, EDL=0.98		pg/g	
		1,2,3,6,7,8-Hexa CDD	2012/09/14	0.85 U, EDL=0.85		pg/g	
		1,2,3,7,8,9-Hexa CDD	2012/09/14	1.40 J, EDL=0.88		pg/g	
		1,2,3,4,6,7,8-Hepta CDD	2012/09/14	2.41 J, EDL=0.98		pg/g	
		Octa CDD	2012/09/14	8.3 J, EDL=1.1		pg/g	
		Total Tetra CDD	2012/09/14	2.07 J, EDL=0.94		pg/g	
		Total Penta CDD	2012/09/14	1.45 J, EDL=0.92		pg/g	
		Total Hexa CDD	2012/09/14	1.40 J, EDL=0.90		pg/g	
		Total Hepta CDD	2012/09/14	2.41 J, EDL=0.98		pg/g	
		2,3,7,8-Tetra CDF	2012/09/14	3.1 U, EDL=3.1 (1)		pg/g	
		1,2,3,7,8-Penta CDF	2012/09/14	2.58 J, EDL=0.94		pg/g	
		2,3,4,7,8-Penta CDF	2012/09/14	2.00 J, EDL=0.95		pg/g	
		1,2,3,4,7,8-Hexa CDF	2012/09/14	0.76 U, EDL=0.76		pg/g	
		1,2,3,6,7,8-Hexa CDF	2012/09/14	2.26 J, EDL=0.76		pg/g	
		2,3,4,6,7,8-Hexa CDF	2012/09/14	2.90 J, EDL=0.85		pg/g	

1 2 3 4 5 6 7 8 9 10 11 12 13

TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report (Continued)

Maxxam Job Number: GB2D4628

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2970998 KKS	Method Blank	1,2,3,7,8,9-Hexa CDF	2012/09/14	0.96 U, EDL=0.96		pg/g	
		1,2,3,4,6,7,8-Hepta CDF	2012/09/14	0.90 U, EDL=0.90		pg/g	
		1,2,3,4,7,8,9-Hepta CDF	2012/09/14	1.2 J, EDL=1.2		pg/g	
		Octa CDF	2012/09/14	0.96 U, EDL=0.96 (2)		pg/g	
		Total Tetra CDF	2012/09/14	5.89 J, EDL=0.93		pg/g	
		Total Penta CDF	2012/09/14	7.71 J, EDL=0.94		pg/g	
		Total Hexa CDF	2012/09/14	5.16 J, EDL=0.82		pg/g	
		Total Hepta CDF	2012/09/14	1.2 J, EDL=1.0		pg/g	
2973209 AGU	Method Blank	Confirmation C13-2378 TetraCDF	2012/09/17		87	%	40 - 135
		Confirmation 2,3,7,8-Tetra CDF	2012/09/17	1.2 U, EDL=1.2		pg/g	
	RPD - Sample/Sample Dup	Confirmation 2,3,7,8-Tetra CDF	2012/09/17	15.5		%	100

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
(2) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.
RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: September 6, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12090101-001/006
Job No.: 440-22022-1
Sample ID.: 440-22022-1/6

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled:	08/29/12
Date Received:	09/01/12
Date Tested:	09/02/12 to 09/06/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-22022-1	PASS (LC50 > 750 mg/l)
440-22022-2	PASS (LC50 > 750 mg/l)
440-22022-3	PASS (LC50 > 750 mg/l)
440-22022-4	PASS (LC50 > 750 mg/l)
440-22022-5	PASS (LC50 > 750 mg/l)
440-22022-6	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12090101-001

Client/ID: TA 440-22022-B-1

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	09-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:	J			J				J				J				J			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.8	8.7	8.0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8.7	8.0	0
400 mg/l A	20.6	8.7	8.5*	20.8	8.1	8.2	0	20.9	8.5	7.9	0	20.8	8.6	7.9	0	20.7	8.7	8.0	0
400 mg/l B	20.6	8.8	8.5*	20.8	8.8	8.3	0	20.9	8.1	8.0	0	20.4	8.5	8.0	0	20.6	8.8	8.0	0
750 mg/l A	20.6	8.9	8.5*	20.7	8.7	8.3	0	20.9	8.4	8.1	0	20.7	8.6	8.0	0	20.7	8.7	8.0	0
750 mg/l B	20.6	8.8	8.5*	20.7	8.8	8.3	0	20.4	8.6	8.2	0	20.4	8.6	8.1	0	21.7	8.7	8.0	0
pH Control	20.9	8.7	8.5*	20.9	8.5	8.1	0	20.7	8.7	8.6	0	20.8	8.7	8.0	0	20.7	8.8	7.9	0

Comments: Extraction method: Mechanical shaking X. * pH adjusted to 8.5
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No pH Control adjusted with HCl/NaOH to pH similar to sample tanks

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	39 mg/l $CaCO_3$	71 mg/l $CaCO_3$
Final	37 mg/l $CaCO_3$	45 mg/l $CaCO_3$	47 mg/l $CaCO_3$	113 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS
(the checked result applies based on fish survival rates)

✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12090101-002

Client/ID: TA 440-22022-B-2

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	09-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:	Z			Z				Z				Z				Z			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.9	8.7	8.0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8.7	8.0	0
400 mg/l A	20.3	8.6	8.6	20.7	8.7	8.4	0	20.8	8.6	8.3	0	20.7	8.7	8.2	0	20.7	8.6	8.1	0
400 mg/l B	20.3	8.7	8.6	20.7	8.7	8.7	0	20.9	8.7	8.2	0	20.6	8.7	8.2	0	20.6	8.5	8.1	0
750 mg/l A	20.2	8.7	8.6	20.8	8.8	8.2	0	20.8	8.8	8.1	0	20.7	8.7	8.1	0	20.7	8.8	8.1	0
750 mg/l B	20.2	8.7	8.6	20.9	8.6	8.2	0	20.9	8.7	8.1	0	20.7	8.8	8.1	0	20.7	8.7	8.0	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	35 mg/l $CaCO_3$	44 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	34 mg/l $CaCO_3$	59 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12090101-003

Client/ID: TA 440-22022-B-3

TEST SUMMARY

Species: ***Pimephales promelas*.**
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	09-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:																			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.8	8.7	8.0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8.7	8.0	0
400 mg/l A	20.3	8.6	8.3	20.7	8.4	8.2	0	20.7	8.6	8.2	0	20.7	8.6	8.1	0	20.7	8.7	8.0	0
400 mg/l B	20.2	8.6	8.3	20.7	8.7	8.2	0	20.8	8.6	8.1	0	20.6	8.7	8.1	0	20.7	8.7	8.0	0
750 mg/l A	20.2	8.6	8.5	20.8	8.8	8.2	0	20.9	8.7	8.1	0	20.7	8.7	8.1	0	20.7	8.7	8.0	0
750 mg/l B	20.7	8.6	8.4	20.7	8.8	8.2	0	20.8	8.6	8.1	0	20.6	8.8	8.1	0	20.7	8.6	8.0	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	34 mg/l $CaCO_3$	44 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	37 mg/l $CaCO_3$	54 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1209061-004

Client/ID: TA 440-22022-B-4

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	9-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:	Z			Z				Z				Z				Z			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.8	8.7	8.0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8.7	8.0	0
400 mg/l A	20.4	8.6	8.5*	20.8	8.8	8.4	0	20.9	8.8	8.4	0	20.7	8.6	8.3	0	20.7	8.7	8.0	0
400 mg/l B	20.4	8.8	8.5*	20.9	8.8	8.5	0	20.8	8.7	8.5	0	20.7	8.6	8.4	0	20.7	8.6	8.1	0
750 mg/l A	20.5	8.9	8.5*	20.9	8.8	8.5	0	20.7	8.6	8.6	0	20.6	8.5	8.8	0	20.7	8.6	8.5	0
750 mg/l B	20.5	8.7	8.5*	20.7	8.8	8.3	0	20.8	8.7	9.1	0	20.7	8.6	8.7	0	20.6	8.6	8.8	0
pH Control	20.9	8.7	8.5*	20.9	8.5	8.1	0	20.7	8.7	8.0	0	20.8	8.7	8.0	0	20.7	8.8	7.9	0

Comments: Extraction method: Mechanical shaking X. * pH adjusted to 8.5
None (aqueous solution) ___.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No pH Control adjusted with HCl/NaOH to pH similar to sample tanks

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	37 mg/l $CaCO_3$	113 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	53 mg/l $CaCO_3$	195 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12090101-005

Client/ID: TA 440-22022-1-5

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	9-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:	Z			Z				Z				Z				Z			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.7	8.7	8.0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8.7	8.0	0
400 mg/l A	20.6	8.8	8.5*	20.7	8.7	8.4	0	20.7	8.4	8.5	0	20.7	8.6	8.6	0	20.7	8.0	8.6	0
400 mg/l B	20.5	8.8	8.5*	20.8	8.7	8.4	0	20.8	8.4	8.6	0	20.7	8.3	8.6	0	20.6	8.2	8.5	0
750 mg/l A	20.4	8.7	8.5*	20.7	8.7	8.4	0	20.7	8.5	8.6	0	20.7	8.5	8.7	0	20.7	8.4	8.7	0
750 mg/l B	20.4	8.7	8.5*	20.8	8.8	8.5	0	20.7	8.7	8.7	0	20.6	8.6	8.6	0	20.7	8.8	8.6	0
pH Control	20.4	8.7	8.5*	20.9	8.5	8.1	0	20.7	8.5	8.0	0	20.4	8.7	9.0	0	20.7	8.8	7.9	0

Comments: Extraction method: Mechanical shaking X. * pH adjusted to 8.5
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No pH Control adjusted with HCl/NaOH to pH similar to sample tanks

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	**Hardness**	**Alkalinity**	**Hardness**
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	43 mg/l $CaCO_3$	111 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	67 mg/l $CaCO_3$	163 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1209010l-006

Client/ID: TA 440-22022-B-6

TEST SUMMARY

Species: ***Pimephales promelas*.**
Fish weight (gm): av: 0.25; min: 0.21; max: 0.28.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	09-2-12 1030			9-3-12 1030				9-4-12 1030				9-5-12 1030				9-6-12 1030			
Analyst:	[illegible]			[illegible]				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.7	8.6	8.1	20.8	8.7	8.1	0	20.8	8.7	8.1	0	20.7	8.7	8.1	0	20.8	8 7	8 0	0
Control B	20.8	8.7	8.1	20.9	8.9	8.0	0	20.7	8.8	8.1	0	20.8	8.8	8.0	0	20.7	8 7	8 0	0
400 mg/l A	20.3	8.7	8.8	20.7	8.8	8.7	0	20.7	8.7	8.7	0	20.7	8.7	8.6	0	20.7	8.7	8.6	0
400 mg/l B	20.4	8.7	8.8	20.7	8.7	8.7	0	20.6	8.6	8.6	0	20.7	8.7	8.6	0	20.6	8.7	8.5	0
750 mg/l A	20.5	8.8	8.1	20.8	8.7	8.8	0	20.7	8.6	8.5	0	20.9	8.6	8.5	0	20.7	8.6	8.3	0
750 mg/l B	20.4	8.7	8.9	20.8	8.7	8.8	0	20.6	8.2	8.5	0	20.7	8.4	8.4	0	20.8	8.3	8.3	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	38 mg/l $CaCO_3$	59 mg/l $CaCO_3$
Final	33 mg/l $CaCO_3$	45 mg/l $CaCO_3$	57 mg/l $CaCO_3$	79 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-10743.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories				Job #: 440-22022-1
Address: 4350 Transport #107, ,	Due Date Requested: 9/10/2012			
City: Ventura	TAT Requested (days):			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Waste to Energy	Project #: 44006380			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, M - Hexane
B - NaOH, N - None
C - Zn Acetate, O - AsNaO2
D - Nitric Acid, P - Na2O4S
E - NaHSO4, Q - Na2SO3
F - MeOH, R - Na2S2SO3
G - Amchlor, S - H2SO4
H - Ascorbic Acid, T - TSP Dodecahydrate
I - Ice, U - Acetone
J - DI Water, V - MCAA
K - EDTA, W - ph 4-5
L - EDA, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	SUBCONTRACT/ Bioassay Haz Waste	Special Instructions/Note:
W9-daily comp-081312 (440-22022-1)	8/29/12	13:55 Pacific		Solid	X	
W9-daily comp-081412 (440-22022-2)	8/29/12	14:05 Pacific		Solid	X	
W9-daily comp-081512 (440-22022-3)	8/29/12	14:15 Pacific		Solid	X	
W9-daily comp-081612 (440-22022-4)	8/29/12	14:30 Pacific		Solid	X	
W9-daily comp-081712 (440-22022-5)	8/29/12	14:35 Pacific		Solid	X	
W9-daily comp-081812 (440-22022-6)	8/29/12	14:40 Pacific		Solid	X	

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Relinquished by: Vu Banly	Date/Time: 8/31/12 17:00	Company: TAI	Received by: FedEx	Date/Time: 8/31/12 17:00	Company: FX
Relinquished by: Fed Ex	Date/Time: 9-1-12 1200	Company: FX	Received by:	Date/Time: 9-1-12 1200	Company: ATL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: X Yes Δ No	Custody Seal No.: —	Cooler Temperature(s) °C and Other Remarks: 1.6

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

440 - 22022

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 08-29-2012	COC No: 7
Steve Madoski	Tel/Fax:	Lab Contact: maung Thein 277-9648	Carrier: FedEx	____ of ____ COCs
Address	Analysis Turnaround Time			Job No.
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below ____			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
W9-daily comp-081312	8/29/2012	13:55	Glass Jar	solid	3		X	X	X	
W9-daily comp-081412	8/29/2012	14:05	Glass Jar	solid	3		X	X	X	
W9-daily comp-081512	8/29/2012	14:15	Glass Jar	solid	3		X	X	X	
W9-daily comp-081612	8/29/2012	14:30	Glass Jar	solid	3		X	X	X	
W9-daily comp-081712	8/29/2012	14:35	Glass Jar	solid	3		X	X	X	
W9-daily comp-081812	8/29/2012	14:40	Glass Jar	solid	3		X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by: [signature]	Company: JTS/Kalimitu	Date/Time: 8/29/12 1440	Received by: [signature]	Company: JTS	Date/Time: 8-29-2012 15:25
Relinquished by: [signature]	Company: JTS	Date/Time: 8-29-12 15:35	Received by: [signature]	Company: TAI	Date/Time: 8/30/12 9:40
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

Form No. CA-C-WI-002, dated 04/07/2011

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-22022-1

Login Number: 22022

List Source: TestAmerica Irvine

List Number: 1

Creator: Freitag, Kevin R

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Refer to Job Narrative for details.
Cooler Temperature is acceptable.	False	Refer to Job Narrative for details.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-25017-1
Client Project/Site: Waste to Energy

For:
JT3 LLC
5 E Popson, Bldg 2650 A
Edwards AFB, California 93524

Attn: Mr. Brian Stone

Authorized for release by:
10/24/2012 3:36:53 PM

Amy Harris
Project Manager I
amy.harris@testamericainc.com

LINKS

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Table of Contents

Sample Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-25017-1	W10-daily comp-091712 (11:35)	Solid	09/28/12 11:35	10/01/12 09:20
440-25017-2	W10-daily comp-091812 (11:40)	Solid	09/28/12 11:40	10/01/12 09:20
440-25017-3	W10-daily comp-091912 (11:45)	Solid	09/28/12 11:45	10/01/12 09:20
440-25017-4	W10-daily comp-092012 (11:50)	Solid	09/28/12 11:50	10/01/12 09:20
440-25017-5	W10-daily comp-092112 (11:55)	Solid	09/28/12 11:55	10/01/12 09:20

Job ID: 440-25017-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-25017-1

Comments
No additional comments.

Receipt
The samples were received on 10/1/2012 9:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 22.0º C.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 440-56789 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 6020: The following sample(s) was diluted due to the nature of the sample matrix: W10-daily comp-091712 (11:35) (440-25017-1). Elevated reporting limits (RLs) are provided.

No other analytical or quality issues were noted.

Subcontract non-Sister
No analytical or quality issues were noted.

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: W10-daily comp-091712 (11:35)
Lab Sample ID: 440-25017-1
Date Collected: 09/28/12 11:35
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	9.3		2.5	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Arsenic	2.9		2.5	2.3	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Barium	130		2.5	0.75	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Beryllium	ND		1.5	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Cadmium	45		2.5	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Chromium	43		5.0	2.0	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Cobalt	4.1		2.5	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Copper	300		5.0	1.3	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Lead	290		2.5	0.50	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Molybdenum	7.6		5.0	0.50	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Nickel	62		5.0	1.3	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Selenium	ND		5.0	1.3	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Thallium	ND		2.5	0.50	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Vanadium	2.9	J	5.0	2.0	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Zinc	1800		50	10	mg/Kg		10/04/12 13:59	10/05/12 12:27	100
Antimony	48		5.0	0.75	mg/Kg		10/04/12 13:59	10/05/12 12:27	100

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	15		2.0	1.2	mg/Kg		10/07/12 14:45	10/09/12 00:20	100

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	5500	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	9820	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	768	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,4,7,8-Hexa CDD	882	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,4,7,8-Hexa CDF	2750	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,6,7,8-Hexa CDD	1380	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,6,7,8-Hexa CDF	3960	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,7,8,9-Hexa CDD	923	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,7,8,9-Hexa CDF	154	J L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,7,8-Penta CDD	1190	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
1,2,3,7,8-Penta CDF	3750	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
2,3,4,6,7,8-Hexa CDF	4450	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
2,3,4,7,8-Penta CDF	5680	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
2,3,7,8-Tetra CDD	519	L8165	93		pg/g		10/03/12 00:00	10/23/12 00:00	1
2,3,7,8-Tetra CDF	7060	L8165	93		pg/g		10/03/12 00:00	10/23/12 00:00	1
Octa CDD	5130	L8165	460		pg/g		10/03/12 00:00	10/23/12 00:00	1
Octa CDF	2470	L8165	460		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Hepta CDD	12600	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Hepta CDF	13900	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Hexa CDD	44300	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Hexa CDF	41200	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Penta CDD	58100	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Penta CDF	80000	L8165	230		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Tetra CDD	3280	L8165	93		pg/g		10/03/12 00:00	10/23/12 00:00	1
Total Tetra CDF	67800	L8165	93		pg/g		10/03/12 00:00	10/23/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*79*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*

Client Sample ID: W10-daily comp-091712 (11:35)
Lab Sample ID: 440-25017-1
Date Collected: 09/28/12 11:35
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDF	*77*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-123478 HexaCDF	*76*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-123678 HexaCDD	*78*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-12378 PentaCDD	*70*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-12378 PentaCDF	*67*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-2378 TetraCDD	*74*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-2378 TetraCDF	*9*	*A2878 A1 L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*
C13-OCDD	*76*	*L8165*	*40 - 135*	*10/03/12 00:00*	*10/23/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	**5.3**		1		%		10/03/12 00:00	10/03/12 00:00	1

Client Sample ID: W10-daily comp-091812 (11:40)
Lab Sample ID: 440-25017-2
Date Collected: 09/28/12 11:40
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**8.2**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Arsenic	**1.8**		0.50	0.45	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Barium	**360**		0.50	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Beryllium	**0.19**	**J**	0.30	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Cadmium	**25**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Chromium	**49**		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Cobalt	**5.3**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Copper	**500**		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Lead	**190**		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Molybdenum	**14**		1.0	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Nickel	**110**		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Selenium	**0.36**	**J**	1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Thallium	ND		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Vanadium	**5.9**		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:29	20
Zinc	**3600**		50	10	mg/Kg		10/04/12 13:59	10/05/12 13:09	100
Antimony	**74**		1.0	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:29	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.11**		0.020	0.012	mg/Kg		10/07/12 14:45	10/08/12 19:56	1

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**1730**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**3770**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	**399**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	**232**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	**1030**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	**300**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	**1020**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	**338**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	**69**		47		pg/g		10/03/12 00:00	10/15/12 00:00	1

Client Sample ID: W10-daily comp-091812 (11:40)
Lab Sample ID: 440-25017-2
Date Collected: 09/28/12 11:40
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,7,8-Penta CDD	281		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8-Penta CDF	814		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	1220		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,4,7,8-Penta CDF	1590		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDD	88		19		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDF	3140		19		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDF	763		9.4		pg/g		10/03/12 00:00	10/15/12 00:00	1
Octa CDD	1830		94		pg/g		10/03/12 00:00	10/15/12 00:00	1
Octa CDF	1250		94		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hepta CDD	3390		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hepta CDF	5460		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hexa CDD	6450		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hexa CDF	10300		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Penta CDD	6270		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Penta CDF	16200		47		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Tetra CDD	6850		19		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Tetra CDF	19100		19		pg/g		10/03/12 00:00	10/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*89*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*83*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-123478 HexaCDF	*81*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-123678 HexaCDD	*85*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-12378 PentaCDD	*87*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-12378 PentaCDF	*74*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDD	*93*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDF	*85*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDF	*92*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-OCDD	*93*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture			1		%		10/03/12 00:00	10/03/12 00:00	1

Client Sample ID: W10-daily comp-091912 (11:45)
Lab Sample ID: 440-25017-3
Date Collected: 09/28/12 11:45
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	18		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Arsenic	0.72		0.50	0.45	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Barium	300		0.50	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Beryllium	0.16	J	0.30	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Cadmium	3.8		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Chromium	60		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Cobalt	7.2		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Copper	5900		5.0	1.3	mg/Kg		10/04/12 13:59	10/05/12 13:12	100
Lead	30		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Molybdenum	11		1.0	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Nickel	190		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Selenium	0.28	J	1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:32	20

Client Sample Results

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Client Sample ID: W10-daily comp-091912 (11:45)
Date Collected: 09/28/12 11:45
Date Received: 10/01/12 09:20

Lab Sample ID: 440-25017-3
Matrix: Solid

Method: 6020 - Metals (ICP/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Thallium	ND		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Vanadium	**7.6**		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:32	20
Zinc	**2800**		50	10	mg/Kg		10/04/12 13:59	10/05/12 13:12	100
Antimony	**24**		1.0	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:32	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.087**		0.020	0.012	mg/Kg		10/07/12 14:45	10/08/12 19:59	1

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**51**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**130**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	11.7	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8-Hexa CDD	5.9	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,4,7,8-Hexa CDF	28.8	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,6,7,8-Hexa CDD	7.71	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,6,7,8-Hexa CDF	33.5	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8,9-Hexa CDD	7.23	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8,9-Hexa CDF	2	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8-Penta CDD	6.42	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
1,2,3,7,8-Penta CDF	23.3	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,4,6,7,8-Hexa CDF	40.7	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,4,7,8-Penta CDF	44	J	46		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDD	2.3	J	18		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDF	**78**		18		pg/g		10/03/12 00:00	10/15/12 00:00	1
2,3,7,8-Tetra CDF	**33.1**		9.2		pg/g		10/03/12 00:00	10/15/12 00:00	1
Octa CDD	71.2	J	92		pg/g		10/03/12 00:00	10/15/12 00:00	1
Octa CDF	42.8	J	92		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hepta CDD	**94**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hepta CDF	**184**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hexa CDD	**137**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Hexa CDF	**327**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Penta CDD	**121**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Penta CDF	**452**		46		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Tetra CDD	**65**		18		pg/g		10/03/12 00:00	10/15/12 00:00	1
Total Tetra CDF	**457**		18		pg/g		10/03/12 00:00	10/15/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*79*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-1234678 HeptaCDF	*73*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-123478 HexaCDF	*73*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-123678 HexaCDD	*87*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-12378 PentaCDD	*127*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-12378 PentaCDF	*99*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDD	*95*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDF	*85*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-2378 TetraCDF	*89*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*
C13-OCDD	*78*		*40 - 135*	*10/03/12 00:00*	*10/15/12 00:00*	*1*

Client Sample ID: W10-daily comp-091912 (11:45) Lab Sample ID: 440-25017-3

Date Collected: 09/28/12 11:45 **Matrix: Solid**
Date Received: 10/01/12 09:20

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture			1		%		10/03/12 00:00	10/03/12 00:00	1

Client Sample ID: W10-daily comp-092012 (11:50) Lab Sample ID: 440-25017-4

Date Collected: 09/28/12 11:50 **Matrix: Solid**
Date Received: 10/01/12 09:20

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**0.60**		0.49	0.049	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Arsenic	ND		0.49	0.44	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Barium	**89**		0.49	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Beryllium	ND		0.30	0.049	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Cadmium	**0.10**	**J**	0.49	0.049	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Chromium	**51**		0.99	0.39	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Cobalt	**1.3**		0.49	0.049	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Copper	**130**		0.99	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Lead	**4.5**		0.49	0.099	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Molybdenum	**0.96**	**J**	0.99	0.099	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Nickel	**450**		0.99	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Selenium	ND		0.99	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Thallium	ND		0.49	0.099	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Vanadium	**1.6**		0.99	0.39	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Zinc	**120**		9.9	2.0	mg/Kg		10/04/12 13:59	10/05/12 12:34	20
Antimony	**3.0**		0.99	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:34	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.054**		0.020	0.012	mg/Kg		10/07/12 14:45	10/08/12 20:01	1

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	24.5	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	**170**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	4.45	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8-Hexa CDD	2.8	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8-Hexa CDF	10.4	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,6,7,8-Hexa CDD	4.1	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,6,7,8-Hexa CDF	14	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8,9-Hexa CDD		A0550	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8,9-Hexa CDF			49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8-Penta CDD	3.58	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8-Penta CDF	9.79	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,4,6,7,8-Hexa CDF	14.8	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,4,7,8-Penta CDF	16	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDD			20		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDF	**44**		20		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDF	**16.5**		9.8		pg/g		10/03/12 00:00	10/14/12 00:00	1
Octa CDD	34	J	98		pg/g		10/03/12 00:00	10/14/12 00:00	1
Octa CDF	34.6	J	98		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hepta CDD	46.3	J	49		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hepta CDF	**260**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hexa CDD	**77**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1

Client Sample ID: W10-daily comp-092012 (11:50)

Lab Sample ID: 440-25017-4

Date Collected: 09/28/12 11:50
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Hexa CDF	**193**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Penta CDD	**86**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Penta CDF	**183**		49		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Tetra CDD	**71**		20		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Tetra CDF	**267**		20		pg/g		10/03/12 00:00	10/14/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*79*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-1234678 HeptaCDF	*74*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-123478 HexaCDF	*73*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-123678 HexaCDD	*75*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-12378 PentaCDD	*80*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-12378 PentaCDF	*80*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDD	*88*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDF	*76*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDF	*81*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-OCDD	*84*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	0.2	J	1		%		10/03/12 00:00	10/03/12 00:00	1

Client Sample ID: W10-daily comp-092112 (11:55)

Lab Sample ID: 440-25017-5

Date Collected: 09/28/12 11:55
Matrix: Solid
Date Received: 10/01/12 09:20

Method: 6020 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	**3.0**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Arsenic	**0.62**		0.50	0.45	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Barium	**250**		0.50	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Beryllium	**0.12**	**J**	0.30	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Cadmium	**17**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Chromium	**27**		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Cobalt	**1.8**		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Copper	**1100**		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Lead	**150**		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Molybdenum	**4.4**		1.0	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Nickel	**59**		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Selenium	**0.25**	**J**	1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Thallium	ND		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Vanadium	**4.2**		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 12:36	20
Zinc	**1700**		50	10	mg/Kg		10/04/12 13:59	10/05/12 13:16	100
Antimony	**22**		1.0	0.15	mg/Kg		10/04/12 13:59	10/05/12 12:36	20

Method: 7471A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**0.025**		0.020	0.012	mg/Kg		10/11/12 15:10	10/11/12 20:03	1

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	**1850**		47		pg/g		10/03/12 00:00	10/14/12 00:00	1

Client Sample ID: W10-daily comp-092112 (11:55)

Date Collected: 09/28/12 11:55
Date Received: 10/01/12 09:20

Lab Sample ID: 440-25017-5
Matrix: Solid

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDF	4230		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	427		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8-Hexa CDD	240		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,4,7,8-Hexa CDF	1060		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,6,7,8-Hexa CDD	295		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,6,7,8-Hexa CDF	1290		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8,9-Hexa CDD	273		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8,9-Hexa CDF	87		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8-Penta CDD	266		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
1,2,3,7,8-Penta CDF	1010		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,4,6,7,8-Hexa CDF	1450		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,4,7,8-Penta CDF	1870		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDD	71		19		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDF		A0551	19		pg/g		10/03/12 00:00	10/14/12 00:00	1
2,3,7,8-Tetra CDF	726		9.3		pg/g		10/03/12 00:00	10/14/12 00:00	1
Octa CDD	2230		93		pg/g		10/03/12 00:00	10/14/12 00:00	1
Octa CDF	1270		93		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hepta CDD	3580		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hepta CDF	6130		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hexa CDD	8610		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Hexa CDF	13300		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Penta CDD	8900		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Penta CDF	22500		47		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Tetra CDD	7780		19		pg/g		10/03/12 00:00	10/14/12 00:00	1
Total Tetra CDF	22200		19		pg/g		10/03/12 00:00	10/14/12 00:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*95*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-1234678 HeptaCDF	*91*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-123478 HexaCDF	*87*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-123678 HexaCDD	*90*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-12378 PentaCDD	*83*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-12378 PentaCDF	*68*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDD	*91*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDF	*80*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-2378 TetraCDF	*83*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*
C13-OCDD	*106*		*40 - 135*	*10/03/12 00:00*	*10/14/12 00:00*	*1*

Method: R.Carter,1993 - R.Carter,1993

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Moisture	0.1	J	1		%		10/03/12 00:00	10/03/12 00:00	1

Lab Chronicle

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Client Sample ID: W10-daily comp-091712 (11:35)

Lab Sample ID: 440-25017-1

Date Collected: 09/28/12 11:35
Matrix: Solid
Date Received: 10/01/12 09:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.99 g	50 mL	56789	10/04/12 13:59	DT	TAL IRV
Total/NA	Analysis	6020		100			57089	10/05/12 12:27	YS	TAL IRV
Total/NA	Prep	7471A			0.49 g	50 mL	57238	10/07/12 14:45	MM	TAL IRV
Total/NA	Analysis	7471A		100			57835	10/09/12 00:20	DB	TAL IRV
Total/NA	Prep	NA		1			2999848_P	10/03/12 00:00		Maxxam
Total/NA	Analysis	8280 Dioxins and Furans 10 day TAT		1			2999848	10/23/12 00:00	OBC	Maxxam
Total/NA	Analysis	R.Carter,1993		1			2991102	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			2991102_P	10/03/12 00:00		Maxxam

Client Sample ID: W10-daily comp-091812 (11:40)

Lab Sample ID: 440-25017-2

Date Collected: 09/28/12 11:40
Matrix: Solid
Date Received: 10/01/12 09:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.99 g	50 mL	56789	10/04/12 13:59	DT	TAL IRV
Total/NA	Analysis	6020		20			57089	10/05/12 12:29	YS	TAL IRV
Total/NA	Analysis	6020		100			57117	10/05/12 13:09	NH	TAL IRV
Total/NA	Prep	7471A			0.50 g	50 mL	57238	10/07/12 14:45	MM	TAL IRV
Total/NA	Analysis	7471A		1			57718	10/08/12 19:56	DB	TAL IRV
Total/NA	Prep	NA		1			2999848_P	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			3001325_P	10/03/12 00:00		Maxxam
Total/NA	Analysis	8280 Dioxins and Furans 10 day TAT		1			3001325	10/15/12 00:00	AGU	Maxxam
Total/NA	Analysis	R.Carter,1993		1			2991102	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			2991102_P	10/03/12 00:00		Maxxam

Client Sample ID: W10-daily comp-091912 (11:45)

Lab Sample ID: 440-25017-3

Date Collected: 09/28/12 11:45
Matrix: Solid
Date Received: 10/01/12 09:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			2.00 g	50 mL	56789	10/04/12 13:59	DT	TAL IRV
Total/NA	Analysis	6020		20			57089	10/05/12 12:32	YS	TAL IRV
Total/NA	Analysis	6020		100			57117	10/05/12 13:12	NH	TAL IRV
Total/NA	Prep	7471A			0.49 g	50 mL	57238	10/07/12 14:45	MM	TAL IRV
Total/NA	Analysis	7471A		1			57718	10/08/12 19:59	DB	TAL IRV
Total/NA	Prep	NA		1			2999848_P	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			3001325_P	10/03/12 00:00		Maxxam
Total/NA	Analysis	8280 Dioxins and Furans 10 day TAT		1			3001325	10/15/12 00:00	AGU	Maxxam
Total/NA	Analysis	R.Carter,1993		1			2991102	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			2991102_P	10/03/12 00:00		Maxxam

Lab Chronicle

Client: JT3 LLC TestAmerica Job ID: 440-25017-1

Project/Site: Waste to Energy

Client Sample ID: W10-daily comp-092012 (11:50) Lab Sample ID: 440-25017-4

Date Collected: 09/28/12 11:50 **Matrix: Solid**

Date Received: 10/01/12 09:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			2.03 g	50 mL	56789	10/04/12 13:59	DT	TAL IRV
Total/NA	Analysis	6020		20			57089	10/05/12 12:34	YS	TAL IRV
Total/NA	Prep	7471A			0.49 g	50 mL	57238	10/07/12 14:45	MM	TAL IRV
Total/NA	Analysis	7471A		1			57718	10/08/12 20:01	DB	TAL IRV
Total/NA	Prep	NA		1			2999848_P	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			3001325_P	10/03/12 00:00		Maxxam
Total/NA	Analysis	8280 Dioxins and Furans 10 day TAT		1			3001325	10/14/12 00:00	AGU	Maxxam
Total/NA	Analysis	R.Carter,1993		1			2991102	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			2991102_P	10/03/12 00:00		Maxxam

Client Sample ID: W10-daily comp-092112 (11:55) Lab Sample ID: 440-25017-5

Date Collected: 09/28/12 11:55 **Matrix: Solid**

Date Received: 10/01/12 09:20

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			1.99 g	50 mL	56789	10/04/12 13:59	DT	TAL IRV
Total/NA	Analysis	6020		20			57089	10/05/12 12:36	YS	TAL IRV
Total/NA	Analysis	6020		100			57117	10/05/12 13:16	NH	TAL IRV
Total/NA	Prep	7471A			0.49 g	50 mL	58526	10/11/12 15:10	MM	TAL IRV
Total/NA	Analysis	7471A		1			58652	10/11/12 20:03	DB	TAL IRV
Total/NA	Prep	NA		1			2999848_P	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			3001325_P	10/03/12 00:00		Maxxam
Total/NA	Analysis	8280 Dioxins and Furans 10 day TAT		1			3001325	10/14/12 00:00	AGU	Maxxam
Total/NA	Analysis	R.Carter,1993		1			2991102	10/03/12 00:00		Maxxam
Total/NA	Prep	NA		1			2991102_P	10/03/12 00:00		Maxxam

Laboratory References:

Maxxam = Maxxam Analytics Inc., PO BOX 57437, Postal Station A, Toronto, Ontario M5W 5M5

SC0127 = Aquatic Testing Laboratories, 4350 Transport #107, Ventura, CA 93003

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 440-56789/1-A ^20 **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 57089 **Prep Batch: 56789**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Silver	ND		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Arsenic	ND		0.50	0.45	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Barium	ND		0.50	0.15	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Beryllium	ND		0.30	0.050	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Cadmium	ND		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Chromium	ND		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Cobalt	ND		0.50	0.050	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Copper	ND		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Lead	ND		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Molybdenum	ND		1.0	0.10	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Nickel	ND		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Selenium	ND		1.0	0.25	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Thallium	ND		0.50	0.10	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Vanadium	ND		1.0	0.40	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Zinc	ND		10	2.0	mg/Kg		10/04/12 13:59	10/05/12 11:54	20
Antimony	ND		1.0	0.15	mg/Kg		10/04/12 13:59	10/05/12 11:54	20

Lab Sample ID: LCS 440-56789/2-A ^20 **Client Sample ID: Lab Control Sample**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 57089 **Prep Batch: 56789**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Silver	24.9	24.0		mg/Kg		96	80 - 120
Arsenic	49.8	46.2		mg/Kg		93	80 - 120
Barium	49.8	43.7		mg/Kg		88	80 - 120
Beryllium	49.8	46.5		mg/Kg		93	80 - 120
Cadmium	49.8	44.2		mg/Kg		89	80 - 120
Chromium	49.8	45.7		mg/Kg		92	80 - 120
Cobalt	49.8	45.7		mg/Kg		92	80 - 120
Copper	49.8	45.7		mg/Kg		92	80 - 120
Lead	49.8	44.0		mg/Kg		88	80 - 120
Molybdenum	49.8	44.4		mg/Kg		89	80 - 120
Nickel	49.8	43.6		mg/Kg		88	80 - 120
Selenium	49.8	46.6		mg/Kg		94	80 - 120
Thallium	49.8	45.2		mg/Kg		91	80 - 120
Vanadium	49.8	45.9		mg/Kg		92	80 - 120
Zinc	49.8	45.5		mg/Kg		92	80 - 120
Antimony	49.8	46.7		mg/Kg		94	80 - 120

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 440-57238/1-A **Client Sample ID: Method Blank**
Matrix: Solid **Prep Type: Total/NA**
Analysis Batch: 57706 **Prep Batch: 57238**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		10/07/12 14:45	10/08/12 14:53	1

Method: 7471A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 440-57238/2-A
Matrix: Solid
Analysis Batch: 57706

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 57238

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.818		mg/Kg		102	80 - 120

Lab Sample ID: MB 440-58526/1-A
Matrix: Solid
Analysis Batch: 58652

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 58526

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.020	0.012	mg/Kg		10/11/12 15:10	10/11/12 19:58	1

Lab Sample ID: LCS 440-58526/2-A
Matrix: Solid
Analysis Batch: 58652

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 58526

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.800	0.703		mg/Kg		88	80 - 120

Lab Sample ID: 440-25017-5 MS
Matrix: Solid
Analysis Batch: 58652

Client Sample ID: W10-daily comp-092112 (11:55)
Prep Type: Total/NA
Prep Batch: 58526

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.025		0.800	0.696		mg/Kg		84	70 - 130

Lab Sample ID: 440-25017-5 MSD
Matrix: Solid
Analysis Batch: 58652

Client Sample ID: W10-daily comp-092112 (11:55)
Prep Type: Total/NA
Prep Batch: 58526

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.025		0.800	0.713		mg/Kg		86	70 - 130	2	20

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method

Lab Sample ID: 2999848-BLK
Matrix: Soil
Analysis Batch: 2999848

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2999848_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2,3,4,6,7,8-Hepta CDD	1.3	J	50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,4,6,7,8-Hepta CDF	ND	A0550	50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,4,7,8,9-Hepta CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,4,7,8-Hexa CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,4,7,8-Hexa CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,6,7,8-Hexa CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,6,7,8-Hexa CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,7,8,9-Hexa CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,7,8,9-Hexa CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,7,8-Penta CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
1,2,3,7,8-Penta CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
2,3,4,6,7,8-Hexa CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
2,3,4,7,8-Penta CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Lab Sample ID: 2999848-BLK
Matrix: Soil
Analysis Batch: 2999848

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 2999848_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDD	ND		20		pg/g		10/03/12 00:00	10/03/12 00:00	1
2,3,7,8-Tetra CDF	ND		20		pg/g		10/03/12 00:00	10/03/12 00:00	1
Octa CDD	8.7	J	100		pg/g		10/03/12 00:00	10/03/12 00:00	1
Octa CDF	1.6	J	100		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Hepta CDD	1.3	J	50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Hepta CDF	ND	A0550	50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Hexa CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Hexa CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Penta CDD	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Penta CDF	ND		50		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Tetra CDD	ND		20		pg/g		10/03/12 00:00	10/03/12 00:00	1
Total Tetra CDF	ND		20		pg/g		10/03/12 00:00	10/03/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-1234678 HeptaCDD	*98*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-1234678 HeptaCDF	*94*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-123478 HexaCDF	*77*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-123678 HexaCDD	*82*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-12378 PentaCDD	*106*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-12378 PentaCDF	*88*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-2378 TetraCDD	*85*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-2378 TetraCDF	*73*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*
C13-OCDD	*98*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*

Lab Sample ID: 2999848-LCS
Matrix: Soil
Analysis Batch: 2999848

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 2999848_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,3,4,6,7,8-Hepta CDD	100	99		pg/g		99	80 - 140
1,2,3,4,6,7,8-Hepta CDF	100	103		pg/g		103	80 - 140
1,2,3,4,7,8,9-Hepta CDF	100	98		pg/g		98	80 - 140
1,2,3,4,7,8-Hexa CDD	100	104		pg/g		104	80 - 140
1,2,3,4,7,8-Hexa CDF	100	100		pg/g		100	80 - 140
1,2,3,6,7,8-Hexa CDD	100	99		pg/g		99	80 - 140
1,2,3,6,7,8-Hexa CDF	100	97		pg/g		97	80 - 140
1,2,3,7,8,9-Hexa CDD	100	109		pg/g		109	80 - 140
1,2,3,7,8,9-Hexa CDF	100	100		pg/g		100	80 - 140
1,2,3,7,8-Penta CDD	100	104		pg/g		104	80 - 140
1,2,3,7,8-Penta CDF	100	101		pg/g		101	80 - 140
2,3,4,6,7,8-Hexa CDF	100	94		pg/g		94	80 - 140
2,3,4,7,8-Penta CDF	100	90		pg/g		90	80 - 140
2,3,7,8-Tetra CDD	100	99		pg/g		99	80 - 140
2,3,7,8-Tetra CDF	100	103		pg/g		103	80 - 140
Octa CDD	100	99		pg/g		99	80 - 140
Octa CDF	100	99		pg/g		99	80 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
C13-1234678 HeptaCDD	*87*		*40 - 135*

Method: 8280 Dioxins and Furans 10 day TAT - General Sub Contract Method (Continued)

Lab Sample ID: 2999848-LCS
Client Sample ID: Lab Control Sample
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 2999848
Prep Batch: 2999848_P

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
C13-1234678 HeptaCDF	*83*		*40 - 135*
C13-123478 HexaCDF	*74*		*40 - 135*
C13-123678 HexaCDD	*88*		*40 - 135*
C13-12378 PentaCDD	*121*		*40 - 135*
C13-12378 PentaCDF	*94*		*40 - 135*
C13-2378 TetraCDD	*94*		*40 - 135*
C13-2378 TetraCDF	*92*		*40 - 135*
C13-OCDD	*78*		*40 - 135*

Lab Sample ID: 3001325-BLK
Client Sample ID: Method Blank
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 3001325
Prep Batch: 3001325_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND	A0550	10		pg/g		10/03/12 00:00	10/03/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-2378 TetraCDF	*73*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*

Method: EPA 8290 mod. - EPA 8290 mod.

Lab Sample ID: 3011167-BLK
Client Sample ID: Method Blank
Matrix: Soil
Prep Type: Total/NA
Analysis Batch: 3011167
Prep Batch: 3011167_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,3,7,8-Tetra CDF	ND		10		pg/g		10/03/12 00:00	10/03/12 00:00	1

Surrogate	*Blank %Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
C13-2378 TetraCDF	*69*		*40 - 135*	*10/03/12 00:00*	*10/03/12 00:00*	*1*

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Metals

Prep Batch: 56789

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	3050B	
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	3050B	
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	3050B	
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	3050B	
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	3050B	
LCS 440-56789/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
MB 440-56789/1-A ^20	Method Blank	Total/NA	Solid	3050B	

Analysis Batch: 57089

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	6020	56789
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	6020	56789
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	6020	56789
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	6020	56789
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	6020	56789
LCS 440-56789/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	56789
MB 440-56789/1-A ^20	Method Blank	Total/NA	Solid	6020	56789

Analysis Batch: 57117

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	6020	56789
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	6020	56789
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	6020	56789

Prep Batch: 57238

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	7471A	
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	7471A	
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	7471A	
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	7471A	
LCS 440-57238/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-57238/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 57706

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 440-57238/2-A	Lab Control Sample	Total/NA	Solid	7471A	57238
MB 440-57238/1-A	Method Blank	Total/NA	Solid	7471A	57238

Analysis Batch: 57718

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	7471A	57238
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	7471A	57238
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	7471A	57238

Analysis Batch: 57835

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	7471A	57238

Prep Batch: 58526

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	
440-25017-5 MS	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	

1 2 3 4 5 6 7 8 9 10 11 12 13

Metals (Continued)

Prep Batch: 58526 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-5 MSD	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	
LCS 440-58526/2-A	Lab Control Sample	Total/NA	Solid	7471A	
MB 440-58526/1-A	Method Blank	Total/NA	Solid	7471A	

Analysis Batch: 58652

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	58526
440-25017-5 MS	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	58526
440-25017-5 MSD	W10-daily comp-092112 (11:55)	Total/NA	Solid	7471A	58526
LCS 440-58526/2-A	Lab Control Sample	Total/NA	Solid	7471A	58526
MB 440-58526/1-A	Method Blank	Total/NA	Solid	7471A	58526

Subcontract

Analysis Batch: 2991102

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	R.Carter,1993	2991102_P
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	R.Carter,1993	2991102_P
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	R.Carter,1993	2991102_P
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	R.Carter,1993	2991102_P
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	R.Carter,1993	2991102_P

Analysis Batch: 2999848

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2999848-BLK	Method Blank	Total/NA	Soil	8280 Dioxins and Furans 10 day TAT	2999848_P
2999848-LCS	Lab Control Sample	Total/NA	Soil	8280 Dioxins and Furans 10 day TAT	2999848_P
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	8280 Dioxins and Furans 10 day TAT	2999848_P

Analysis Batch: 3001325

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
3001325-BLK	Method Blank	Total/NA	Soil	8280 Dioxins and Furans 10 day TAT	3001325_P
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	8280 Dioxins and Furans 10 day TAT	3001325_P
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	8280 Dioxins and Furans 10 day TAT	3001325_P
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	8280 Dioxins and Furans 10 day TAT	3001325_P
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	8280 Dioxins and Furans 10 day TAT	3001325_P

Analysis Batch: 3011167

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
3011167-BLK	Method Blank	Total/NA	Soil	EPA 8290 mod.	3011167_P

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Subcontract (Continued)

Prep Batch: 2991102_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	NA	
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	NA	
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	NA	
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	NA	
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	NA	

Prep Batch: 2999848_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
2999848-BLK	Method Blank	Total/NA	Soil	NA	
2999848-LCS	Lab Control Sample	Total/NA	Soil	NA	
440-25017-1	W10-daily comp-091712 (11:35)	Total/NA	Solid	NA	
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	NA	
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	NA	
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	NA	
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	NA	

Prep Batch: 3001325_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
3001325-BLK	Method Blank	Total/NA	Soil	NA	
440-25017-2	W10-daily comp-091812 (11:40)	Total/NA	Solid	NA	
440-25017-3	W10-daily comp-091912 (11:45)	Total/NA	Solid	NA	
440-25017-4	W10-daily comp-092012 (11:50)	Total/NA	Solid	NA	
440-25017-5	W10-daily comp-092112 (11:55)	Total/NA	Solid	NA	

Prep Batch: 3011167_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
3011167-BLK	Method Blank	Total/NA	Soil	NA	

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Subcontract

Qualifier	Qualifier Description
L8165	** All results taken from 5X Dilution Run **
J	Estimated concentration between the EDL and RDL
A3208	Archived portion analyzed
A2878	** Internal standard recovery is below 40-135% criteria **
A1	Exceedence
A3207	Internal standard recovery below 40-135% range.
A0550	EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.
A0551	RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: JT3 LLC
Project/Site: Waste to Energy

TestAmerica Job ID: 440-25017-1

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-13
New Mexico	State Program	6	N/A	01-31-13
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14
USEPA UCMR	Federal	1	CA01531	01-31-13

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ACCREDITED IN ACCORDANCE WITH nelac

Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: na

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/10/23

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B2F3156
Received: 2012/10/03, 11:17

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Dioxins/Furans in Soil (8290) (1)	4	2012/10/03	2012/10/12	BRL SOP-00406	EPA 8290 mod.
Dioxins/Furans in Soil (8290) (1)	1	2012/10/03	2012/10/23	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	2	N/A	2012/10/14	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	2	N/A	2012/10/15	BRL SOP-00406	EPA 8290 mod.
2378TCDF Confirmation in Soil	1	N/A	2012/10/23	BRL SOP-00406	EPA 8290 mod.
Moisture	5	N/A	2012/10/03	CAM SOP-00445	R.Carter,1993

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Soils are reported on a dry weight basis unless otherwise specified.

Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.

U = Undetected at the limit of quantitation.
J = Estimated concentration between the EDL & RDL.
B = Blank Contamination.
Q = One or more quality control criteria failed.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Ivana Vukovic, Env Project Manager
Email: IVukovic@maxxam.ca
Phone# (905) 817-5700

==
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Your Project #: 44006380
Site Location: WASTE TO ENERGY
Your C.O.C. #: na

Attention: Amy Harris
TestAmerica
17461 Derian Ave
Suite 100
Irvine, CA
USA 92614

Report Date: 2012/10/23

CERTIFICATE OF ANALYSIS

-2-

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Total cover pages: 2

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

RESULTS OF ANALYSES OF SOIL

Maxxam ID		PB5447	PB5448	PB5449	PB5450	PB5451		
Sampling Date		2012/09/28 11:35	2012/09/28 11:40	2012/09/28 11:45	2012/09/28 11:50	2012/09/28 11:55		
COC Number		na	na	na	na	na		
	Units	**W10-DAILY COMP-091712 (11:35) (440-25017-1)**	**W10-DAILY COMP-091812 (11:40) (440-25017-2)**	**W10-DAILY COMP-091912 (11:45) (440-25017-3)**	**W10-DAILY COMP-092012 (11:50) (440-25017-4)**	**W10-DAILY COMP-092112 (11:55) (440-25017-5)**	**QC Batch**	**RDL**
Moisture	%	5.3	0.040 U	0.040 U	0.20 J	0.10 J	2991102	1.0

QC Batch = Quality Control Batch

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5447						
Sampling Date		2012/09/28 11:35						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-091712 (11:35) (440-25017-1)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	519	6.1	1.00	519		2999848	20
1,2,3,7,8-Penta CDD	pg/g	1190	15	1.00	1190		2999848	50
1,2,3,4,7,8-Hexa CDD	pg/g	882	6.4	0.100	88.2		2999848	50
1,2,3,6,7,8-Hexa CDD	pg/g	1380	5.9	0.100	138		2999848	50
1,2,3,7,8,9-Hexa CDD	pg/g	923	6.1	0.100	92.3		2999848	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	5500	7.5	0.0100	55.0		2999848	50
Octa CDD	pg/g	5130	8.3	0.000300	1.54		2999848	100
Total Tetra CDD	pg/g	3280	6.1				2999848	20
Total Penta CDD	pg/g	58100	15				2999848	50
Total Hexa CDD	pg/g	44300	6.1				2999848	50
Total Hepta CDD	pg/g	12600	7.5				2999848	50
2,3,7,8-Tetra CDF **	pg/g	7060	34	0.100	706		2999848	20
1,2,3,7,8-Penta CDF	pg/g	3750	5.3	0.0300	113		2999848	50
2,3,4,7,8-Penta CDF	pg/g	5680	5.4	0.300	1700		2999848	50
1,2,3,4,7,8-Hexa CDF	pg/g	2750	5.6	0.100	275		2999848	50
1,2,3,6,7,8-Hexa CDF	pg/g	3960	5.5	0.100	396		2999848	50
2,3,4,6,7,8-Hexa CDF	pg/g	4450	6.1	0.100	445		2999848	50
1,2,3,7,8,9-Hexa CDF	pg/g	154 J	6.8	0.100	15.4		2999848	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	9820	4.9	0.0100	98.2		2999848	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	768	6.3	0.0100	7.68		2999848	50
Octa CDF	pg/g	2470	7.2	0.000300	0.741		2999848	100
Total Tetra CDF	pg/g	67800	34				2999848	20
Total Penta CDF	pg/g	80000	5.4				2999848	50
Total Hexa CDF	pg/g	41200	6.0				2999848	50
Total Hepta CDF	pg/g	13900	5.5				2999848	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	3080 (1)	40	0.100	308		3011167	N/A

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) Archived portion analyzed

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

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DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5447						
Sampling Date		2012/09/28 11:35						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	W10-DAILY COMP-091712 (11:35) (440-25017-1)	EDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	RDL

TOTAL TOXIC EQUIVALENCY	pg/g				5440			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	79					2999848	
C13-1234678 HeptaCDF **	%	77					2999848	
C13-123478 HexaCDF	%	76					2999848	
C13-123678 HexaCDD	%	78					2999848	
C13-12378 PentaCDD	%	70					2999848	
C13-12378 PentaCDF	%	67					2999848	
C13-2378 TetraCDD	%	74					2999848	
C13-2378 TetraCDF	%	9.0 (1)					2999848	
C13-OCDD	%	76					2999848	
Confirmation C13-2378 TetraCDF	%	16 (2)					3011167	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) ** Internal standard recovery is below 40-135% criteria **
(2) Internal standard recovery below 40-135% range.

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5448						
Sampling Date		2012/09/28 11:40						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-091812 (11:40) (440-25017-2)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	88	1.0	1.00	88.0		2999848	20
1,2,3,7,8-Penta CDD	pg/g	281	0.95	1.00	281		2999848	50
1,2,3,4,7,8-Hexa CDD	pg/g	232	1.1	0.100	23.2		2999848	50
1,2,3,6,7,8-Hexa CDD	pg/g	300	0.92	0.100	30.0		2999848	50
1,2,3,7,8,9-Hexa CDD	pg/g	338	0.92	0.100	33.8		2999848	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	1730	0.93	0.0100	17.3		2999848	50
Octa CDD	pg/g	1830	0.99	0.000300	0.549		2999848	100
Total Tetra CDD	pg/g	6850	1.0				2999848	20
Total Penta CDD	pg/g	6270	0.95				2999848	50
Total Hexa CDD	pg/g	6450	0.97				2999848	50
Total Hepta CDD	pg/g	3390	0.93				2999848	50
2,3,7,8-Tetra CDF **	pg/g	3140	0.99	0.100	314		2999848	20
1,2,3,7,8-Penta CDF	pg/g	814	5.2	0.0300	24.4		2999848	50
2,3,4,7,8-Penta CDF	pg/g	1590	5.6	0.300	477		2999848	50
1,2,3,4,7,8-Hexa CDF	pg/g	1030	0.96	0.100	103		2999848	50
1,2,3,6,7,8-Hexa CDF	pg/g	1020	0.95	0.100	102		2999848	50
2,3,4,6,7,8-Hexa CDF	pg/g	1220	1.1	0.100	122		2999848	50
1,2,3,7,8,9-Hexa CDF	pg/g	69	1.2	0.100	6.90		2999848	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	3770	0.87	0.0100	37.7		2999848	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	399	1.1	0.0100	3.99		2999848	50
Octa CDF	pg/g	1250	1.0	0.000300	0.375		2999848	100
Total Tetra CDF	pg/g	19100	0.99				2999848	20
Total Penta CDF	pg/g	16200	5.4				2999848	50
Total Hexa CDF	pg/g	10300	1.0				2999848	50
Total Hepta CDF	pg/g	5460	0.97				2999848	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	763	2.1	0.100	76.3		3001325	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				1430			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5448						
Sampling Date		2012/09/28 11:40						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-091812 (11:40) (440-25017-2)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	89					2999848	
C13-1234678 HeptaCDF **	%	83					2999848	
C13-123478 HexaCDF	%	81					2999848	
C13-123678 HexaCDD	%	85					2999848	
C13-12378 PentaCDD	%	87					2999848	
C13-12378 PentaCDF	%	74					2999848	
C13-2378 TetraCDD	%	93					2999848	
C13-2378 TetraCDF	%	85					2999848	
C13-OCDD	%	93					2999848	
Confirmation C13-2378 TetraCDF	%	92					3001325	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5449						
Sampling Date		2012/09/28 11:45						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-091912 (11:45) (440-25017-3)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	2.3 J	1.1	1.00	2.30		2999848	20
1,2,3,7,8-Penta CDD	pg/g	6.42 J	0.93	1.00	6.42		2999848	50
1,2,3,4,7,8-Hexa CDD	pg/g	5.9 J	1.0	0.100	0.590		2999848	50
1,2,3,6,7,8-Hexa CDD	pg/g	7.71 J	0.91	0.100	0.771		2999848	50
1,2,3,7,8,9-Hexa CDD	pg/g	7.23 J	0.91	0.100	0.723		2999848	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	51	0.97	0.0100	0.510		2999848	50
Octa CDD	pg/g	71.2 J	0.89	0.000300	0.0214		2999848	100
Total Tetra CDD	pg/g	65	1.1				2999848	20
Total Penta CDD	pg/g	121	0.93				2999848	50
Total Hexa CDD	pg/g	137	0.95				2999848	50
Total Hepta CDD	pg/g	94	0.97				2999848	50
2,3,7,8-Tetra CDF **	pg/g	78	1.1	0.100	7.80		2999848	20
1,2,3,7,8-Penta CDF	pg/g	23.3 J	0.90	0.0300	0.699		2999848	50
2,3,4,7,8-Penta CDF	pg/g	44.0 J	0.97	0.300	13.2		2999848	50
1,2,3,4,7,8-Hexa CDF	pg/g	28.8 J	0.84	0.100	2.88		2999848	50
1,2,3,6,7,8-Hexa CDF	pg/g	33.5 J	0.83	0.100	3.35		2999848	50
2,3,4,6,7,8-Hexa CDF	pg/g	40.7 J	0.92	0.100	4.07		2999848	50
1,2,3,7,8,9-Hexa CDF	pg/g	2.0 J	1.0	0.100	0.200		2999848	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	130	0.80	0.0100	1.30		2999848	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	11.7 J	1.0	0.0100	0.117		2999848	50
Octa CDF	pg/g	42.8 J	1.1	0.000300	0.0128		2999848	100
Total Tetra CDF	pg/g	457	1.1				2999848	20
Total Penta CDF	pg/g	452	0.94				2999848	50
Total Hexa CDF	pg/g	327	0.89				2999848	50
Total Hepta CDF	pg/g	184	0.90				2999848	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	33.1	1.7	0.100	3.31		3001325	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				40.5			

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5449						
Sampling Date		2012/09/28 11:45						
COC Number		na		**TOXIC EQUIVALENCY**		**# of**		
	Units	**W10-DAILY COMP-091912 (11:45) (440-25017-3)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	79					2999848	
C13-1234678 HeptaCDF **	%	73					2999848	
C13-123478 HexaCDF	%	73					2999848	
C13-123678 HexaCDD	%	87					2999848	
C13-12378 PentaCDD	%	127					2999848	
C13-12378 PentaCDF	%	99					2999848	
C13-2378 TetraCDD	%	95					2999848	
C13-2378 TetraCDF	%	85					2999848	
C13-OCDD	%	78					2999848	
Confirmation C13-2378 TetraCDF	%	89					3001325	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5450						
Sampling Date		2012/09/28 11:50						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	W10-DAILY COMP-092012 (11:50) (440-25017-4)	EDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	RDL
2,3,7,8-Tetra CDD *	pg/g	1.1 U	1.1	1.00	1.10		2999848	20
1,2,3,7,8-Penta CDD	pg/g	3.58 J	0.88	1.00	3.58		2999848	50
1,2,3,4,7,8-Hexa CDD	pg/g	2.8 J	1.2	0.100	0.280		2999848	50
1,2,3,6,7,8-Hexa CDD	pg/g	4.1 J	1.1	0.100	0.410		2999848	50
1,2,3,7,8,9-Hexa CDD	pg/g	3.7 U (1)	3.7	0.100	0.370		2999848	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	24.5 J	0.91	0.0100	0.245		2999848	50
Octa CDD	pg/g	34.0 J	1.0	0.000300	0.0102		2999848	100
Total Tetra CDD	pg/g	71	1.1				2999848	20
Total Penta CDD	pg/g	86	0.88				2999848	50
Total Hexa CDD	pg/g	77	1.1				2999848	50
Total Hepta CDD	pg/g	46.3 J	0.91				2999848	50
2,3,7,8-Tetra CDF **	pg/g	44	0.90	0.100	4.40		2999848	20
1,2,3,7,8-Penta CDF	pg/g	9.79 J	0.89	0.0300	0.294		2999848	50
2,3,4,7,8-Penta CDF	pg/g	16.0 J	0.96	0.300	4.80		2999848	50
1,2,3,4,7,8-Hexa CDF	pg/g	10.4 J	0.85	0.100	1.04		2999848	50
1,2,3,6,7,8-Hexa CDF	pg/g	14.0 J	0.83	0.100	1.40		2999848	50
2,3,4,6,7,8-Hexa CDF	pg/g	14.8 J	0.92	0.100	1.48		2999848	50
1,2,3,7,8,9-Hexa CDF	pg/g	1.0 U	1.0	0.100	0.100		2999848	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	170	0.72	0.0100	1.70		2999848	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	4.45 J	0.91	0.0100	0.0445		2999848	50
Octa CDF	pg/g	34.6 J	1.0	0.000300	0.0104		2999848	100
Total Tetra CDF	pg/g	267	0.90				2999848	20
Total Penta CDF	pg/g	183	0.93				2999848	50
Total Hexa CDF	pg/g	193	0.90				2999848	50
Total Hepta CDF	pg/g	260	0.81				2999848	50
Confirmation 2,3,7,8-Tetra CDF	pg/g	16.5	1.8	0.100	1.65		3001325	N/A

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5450						
Sampling Date		2012/09/28 11:50						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-092012 (11:50) (440-25017-4)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
TOTAL TOXIC EQUIVALENCY	pg/g				18.5			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	79					2999848	
C13-1234678 HeptaCDF **	%	74					2999848	
C13-123478 HexaCDF	%	73					2999848	
C13-123678 HexaCDD	%	75					2999848	
C13-12378 PentaCDD	%	80					2999848	
C13-12378 PentaCDF	%	80					2999848	
C13-2378 TetraCDD	%	88					2999848	
C13-2378 TetraCDF	%	76					2999848	
C13-OCDD	%	84					2999848	
Confirmation C13-2378 TetraCDF	%	81					3001325	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5451						
Sampling Date		2012/09/28 11:55						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	**W10-DAILY COMP-092112 (11:55) (440-25017-5)**	**EDL**	**TEF (2005 WHO)**	**TEQ(DL)**	**Isomers**	**QC Batch**	**RDL**
2,3,7,8-Tetra CDD *	pg/g	71	1.1	1.00	71.0		2999848	20
1,2,3,7,8-Penta CDD	pg/g	266	1.1	1.00	266		2999848	50
1,2,3,4,7,8-Hexa CDD	pg/g	240	1.7	0.100	24.0		2999848	50
1,2,3,6,7,8-Hexa CDD	pg/g	295	1.5	0.100	29.5		2999848	50
1,2,3,7,8,9-Hexa CDD	pg/g	273	1.5	0.100	27.3		2999848	50
1,2,3,4,6,7,8-Hepta CDD	pg/g	1850	1.1	0.0100	18.5		2999848	50
Octa CDD	pg/g	2230	1.7	0.000300	0.669		2999848	100
Total Tetra CDD	pg/g	7780	1.1				2999848	20
Total Penta CDD	pg/g	8900	1.1				2999848	50
Total Hexa CDD	pg/g	8610	1.6				2999848	50
Total Hepta CDD	pg/g	3580	1.1				2999848	50
2,3,7,8-Tetra CDF **	pg/g	3800 U (1)	3800	0.100	380		2999848	20
1,2,3,7,8-Penta CDF	pg/g	1010	1.5	0.0300	30.3		2999848	50
2,3,4,7,8-Penta CDF	pg/g	1870	1.6	0.300	561		2999848	50
1,2,3,4,7,8-Hexa CDF	pg/g	1060	1.5	0.100	106		2999848	50
1,2,3,6,7,8-Hexa CDF	pg/g	1290	1.5	0.100	129		2999848	50
2,3,4,6,7,8-Hexa CDF	pg/g	1450	1.7	0.100	145		2999848	50
1,2,3,7,8,9-Hexa CDF	pg/g	87	1.8	0.100	8.70		2999848	50
1,2,3,4,6,7,8-Hepta CDF	pg/g	4230	0.73	0.0100	42.3		2999848	50
1,2,3,4,7,8,9-Hepta CDF	pg/g	427	0.92	0.0100	4.27		2999848	50
Octa CDF	pg/g	1270	2.2	0.000300	0.381		2999848	100
Total Tetra CDF	pg/g	22200	0.89				2999848	20
Total Penta CDF	pg/g	22500	1.6				2999848	50
Total Hexa CDF	pg/g	13300	1.6				2999848	50
Total Hepta CDF	pg/g	6130	0.81				2999848	50

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
(1) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

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1 2 3 4 5 6 7 8 9 10 11 12 13

Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

DIOXINS AND FURANS BY HRMS (SOIL)

Maxxam ID		PB5451						
Sampling Date		2012/09/28 11:55						
COC Number		na		TOXIC EQUIVALENCY		# of		
	Units	W10-DAILY COMP-092112 (11:55) (440-25017-5)	EDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch	RDL
Confirmation 2,3,7,8-Tetra CDF **	pg/g	726	3.0	0.100	72.6		3001325	N/A
TOTAL TOXIC EQUIVALENCY	pg/g				1540			
Surrogate Recovery (%)								
C13-1234678 HeptaCDD *	%	95					2999848	
C13-1234678 HeptaCDF	%	91					2999848	
C13-123478 HexaCDF	%	87					2999848	
C13-123678 HexaCDD	%	90					2999848	
C13-12378 PentaCDD	%	83					2999848	
C13-12378 PentaCDF	%	68					2999848	
C13-2378 TetraCDD	%	91					2999848	
C13-2378 TetraCDF	%	80					2999848	
C13-OCDD	%	106					2999848	
Confirmation C13-2378 TetraCDF	%	83					3001325	

EDL = Estimated Detection Limit
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin, ** CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

Test Summary

Maxxam ID PB5447
Sample ID W10-DAILY COMP-091712 (11:35) (440-25017-1)
Matrix Soil

Collected 2012/09/28
Shipped
Received 2012/10/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2999848	2012/10/03	2012/10/23	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3011167	N/A	2012/10/23	Vica Cioranic
Moisture	BAL	2991102	N/A	2012/10/03	Min Yang

Maxxam ID PB5448
Sample ID W10-DAILY COMP-091812 (11:40) (440-25017-2)
Matrix Soil

Collected 2012/09/28
Shipped
Received 2012/10/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2999848	2012/10/03	2012/10/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3001325	N/A	2012/10/15	Angel Guerrero
Moisture	BAL	2991102	N/A	2012/10/03	Min Yang

Maxxam ID PB5449
Sample ID W10-DAILY COMP-091912 (11:45) (440-25017-3)
Matrix Soil

Collected 2012/09/28
Shipped
Received 2012/10/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2999848	2012/10/03	2012/10/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3001325	N/A	2012/10/15	Angel Guerrero
Moisture	BAL	2991102	N/A	2012/10/03	Min Yang

Maxxam ID PB5450
Sample ID W10-DAILY COMP-092012 (11:50) (440-25017-4)
Matrix Soil

Collected 2012/09/28
Shipped
Received 2012/10/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2999848	2012/10/03	2012/10/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3001325	N/A	2012/10/14	Angel Guerrero
Moisture	BAL	2991102	N/A	2012/10/03	Min Yang

Maxxam ID PB5451
Sample ID W10-DAILY COMP-092112 (11:55) (440-25017-5)
Matrix Soil

Collected 2012/09/28
Shipped
Received 2012/10/03

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Dioxins/Furans in Soil (8290)	HRMS/MS	2999848	2012/10/03	2012/10/12	Owen Cosby
2378TCDF Confirmation in Soil	HRMS/MS	3001325	N/A	2012/10/14	Angel Guerrero
Moisture	BAL	2991102	N/A	2012/10/03	Min Yang

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Maxxam Job #: B2F3156
Report Date: 2012/10/23

TestAmerica
Client Project #: 44006380
Site Location: WASTE TO ENERGY

GENERAL COMMENTS

Samples reported on a wet weight basis as per client request

Sample PB5447-01: Archived portion analyzed at 5x dilution due to linear calibration range exceedances.

The TCDF internal standard recovery was low in the initial analysis as well.

DIOXINS AND FURANS BY HRMS (SOIL)

Sample PB5447-01 Dioxins/Furans in Soil (8290): ** All results taken from 5X Dilution Run **

Results relate only to the items tested.

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TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report

Maxxam Job Number: GB2F3156

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2991102 BOP	RPD - Sample/Sample Dup	Moisture	2012/10/03	0		%	20
2999848 OBC	Spiked Blank	C13-1234678 HeptaCDD	2012/10/12		87	%	40 - 135
		C13-1234678 HeptaCDF	2012/10/12		83	%	40 - 135
		C13-123478 HexaCDF	2012/10/12		74	%	40 - 135
		C13-123678 HexaCDD	2012/10/12		88	%	40 - 135
		C13-12378 PentaCDD	2012/10/12		121	%	40 - 135
		C13-12378 PentaCDF	2012/10/12		94	%	40 - 135
		C13-2378 TetraCDD	2012/10/12		94	%	40 - 135
		C13-2378 TetraCDF	2012/10/12		92	%	40 - 135
		C13-OCDD	2012/10/12		78	%	40 - 135
		2,3,7,8-Tetra CDD	2012/10/12		99	%	80 - 140
		1,2,3,7,8-Penta CDD	2012/10/12		104	%	80 - 140
		1,2,3,4,7,8-Hexa CDD	2012/10/12		104	%	80 - 140
		1,2,3,6,7,8-Hexa CDD	2012/10/12		99	%	80 - 140
		1,2,3,7,8,9-Hexa CDD	2012/10/12		109	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDD	2012/10/12		99	%	80 - 140
		Octa CDD	2012/10/12		99	%	80 - 140
		2,3,7,8-Tetra CDF	2012/10/12		103	%	80 - 140
		1,2,3,7,8-Penta CDF	2012/10/12		101	%	80 - 140
		2,3,4,7,8-Penta CDF	2012/10/12		90	%	80 - 140
		1,2,3,4,7,8-Hexa CDF	2012/10/12		100	%	80 - 140
		1,2,3,6,7,8-Hexa CDF	2012/10/12		97	%	80 - 140
		2,3,4,6,7,8-Hexa CDF	2012/10/12		94	%	80 - 140
		1,2,3,7,8,9-Hexa CDF	2012/10/12		100	%	80 - 140
		1,2,3,4,6,7,8-Hepta CDF	2012/10/12		103	%	80 - 140
		1,2,3,4,7,8,9-Hepta CDF	2012/10/12		98	%	80 - 140
		Octa CDF	2012/10/12		99	%	80 - 140
	Method Blank	C13-1234678 HeptaCDD	2012/10/12		98	%	40 - 135
		C13-1234678 HeptaCDF	2012/10/12		94	%	40 - 135
		C13-123478 HexaCDF	2012/10/12		77	%	40 - 135
		C13-123678 HexaCDD	2012/10/12		82	%	40 - 135
		C13-12378 PentaCDD	2012/10/12		106	%	40 - 135
		C13-12378 PentaCDF	2012/10/12		88	%	40 - 135
		C13-2378 TetraCDD	2012/10/12		85	%	40 - 135
		C13-2378 TetraCDF	2012/10/12		73	%	40 - 135
		C13-OCDD	2012/10/12		98	%	40 - 135
		2,3,7,8-Tetra CDD	2012/10/12	1.1 U, EDL=1.1		pg/g	
		1,2,3,7,8-Penta CDD	2012/10/12	1.0 U, EDL=1.0		pg/g	
		1,2,3,4,7,8-Hexa CDD	2012/10/12	1.3 U, EDL=1.3		pg/g	
		1,2,3,6,7,8-Hexa CDD	2012/10/12	1.1 U, EDL=1.1		pg/g	
		1,2,3,7,8,9-Hexa CDD	2012/10/12	1.1 U, EDL=1.1		pg/g	
		1,2,3,4,6,7,8-Hepta CDD	2012/10/12	1.30 J, EDL=0.97		pg/g	
		Octa CDD	2012/10/12	8.7 J, EDL=1.1		pg/g	
		Total Tetra CDD	2012/10/12	1.1 U, EDL=1.1		pg/g	
		Total Penta CDD	2012/10/12	1.0 U, EDL=1.0		pg/g	
		Total Hexa CDD	2012/10/12	1.1 U, EDL=1.1		pg/g	
		Total Hepta CDD	2012/10/12	1.30 J, EDL=0.97		pg/g	
		2,3,7,8-Tetra CDF	2012/10/12	0.97 U, EDL=0.97		pg/g	
		1,2,3,7,8-Penta CDF	2012/10/12	1.1 U, EDL=1.1		pg/g	
		2,3,4,7,8-Penta CDF	2012/10/12	1.2 U, EDL=1.2		pg/g	
		1,2,3,4,7,8-Hexa CDF	2012/10/12	0.95 U, EDL=0.95		pg/g	
		1,2,3,6,7,8-Hexa CDF	2012/10/12	0.94 U, EDL=0.94		pg/g	
		2,3,4,6,7,8-Hexa CDF	2012/10/12	1.0 U, EDL=1.0		pg/g	

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TestAmerica
Attention: Amy Harris
Client Project #: 44006380
P.O. #:
Site Location: WASTE TO ENERGY

Quality Assurance Report (Continued)

Maxxam Job Number: GB2F3156

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
2999848 OBC	Method Blank	1,2,3,7,8,9-Hexa CDF	2012/10/12	1.1 U, EDL=1.1		pg/g	
		1,2,3,4,6,7,8-Hepta CDF	2012/10/12	0.90 U, EDL=0.90 (1)		pg/g	
		1,2,3,4,7,8,9-Hepta CDF	2012/10/12	1.1 U, EDL=1.1		pg/g	
		Octa CDF	2012/10/12	1.6 J, EDL=1.1		pg/g	
		Total Tetra CDF	2012/10/12	0.97 U, EDL=0.97		pg/g	
		Total Penta CDF	2012/10/12	1.2 U, EDL=1.2		pg/g	
		Total Hexa CDF	2012/10/12	1.0 U, EDL=1.0		pg/g	
		Total Hepta CDF	2012/10/12	1.0 U, EDL=1.0 (1)		pg/g	
3001325 AGU	Method Blank	Confirmation C13-2378 TetraCDF	2012/10/14		73	%	40 - 135
		Confirmation 2,3,7,8-Tetra CDF	2012/10/14	2.4 U, EDL=2.4 (1)		pg/g	
3011167 VCI	Method Blank	Confirmation C13-2378 TetraCDF	2012/10/23		69	%	40 - 135
		Confirmation 2,3,7,8-Tetra CDF	2012/10/23	1.1 U, EDL=1.1		pg/g	

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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LABORATORY REPORT

Aquatic Testing Laboratories

"dedicated to providing quality aquatic toxicity testing"

4350 Transport Street, Unit 107
Ventura, CA 93003
(805) 650-0546 FAX (805) 650-0756
CA DOHS ELAP Cert. No.: 1775

Date: October 8, 2012

Client: TestAmerica, Irvine
17461 Derian Ave., Suite 100
Irvine, CA 92614
Attn: Amy Harris

Laboratory No.: A-12100304-001/005
Job No.: 440-25017-1
Sample ID.: 440-25017-1/5

Sample Control: The samples were received by ATL in a chilled state, with the chain of custody record attached.

Date Sampled: 09/28/12
Date Received: 10/03/12
Date Tested: 10/04/12 to 10/08/12

Sample Analysis: The following analyses were performed on your sample:

CCR Title 22 Fathead Minnow Hazardous Waste Screen Bioassay (Polisini & Miller 1988).

Attached are the test data generated from the analysis of your sample. All testing was conducted under the direct supervision of Joseph A. LeMay.

Result Summary:

Sample ID.	Results
440-25017-1	FAIL (LC50 < 400 mg/l)
440-25017-2	PASS (LC50 > 750 mg/l)
440-25017-3	PASS (LC50 > 750 mg/l)
440-25017-4	PASS (LC50 > 750 mg/l)
440-25017-5	PASS (LC50 > 750 mg/l)

Quality Control: Reviewed and approved by:

Joseph A. LeMay
Laboratory Director

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12100304-001

Client/ID: TA 440-25017-C-1

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.29; min: 0.23; max: 0.34.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	10-4-12 1100			10-5-12 1000				10-6-12 1100				10-7-12 1030				10-8-12 1030			
Analyst:	[illegible]			[illegible]				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.7	8.2	20.8	8.5	8.0	0	21.0	8.7	7.9	0	20.7	8.7	7.9	0	20.7	8.7	8.0	0
Control B	20.5	8.8	8.2	20.8	8.8	7.8	0	21.0	8.8	7.9	0	20.8	8.8	7.9	0	20.7	8.8	8.0	0
400 mg/l A	20.4	8.7	8.3	20.8	8.6	8.2	0	21.0	8.3	7.9	1	20.9	8.6	7.8	5	20.8	8.0	7.9	0
400 mg/l B	20.5	8.6	8.4	20.8	8.2	8.2	0	20.9	7.8	7.9	0	20.9	8.0	7.9	7	20.9	7.8	7.8	0
750 mg/l A	20.6	8.6	8.5	20.7	8.7	8.4	5	20.9	7.3	7.6	5	-	-	-	-	-	-	-	-
750 mg/l B	20.6	8.7	8.5	20.7	8.4	8.4	5	20.4	7.2	7.7	5	-	-	-	-	-	-	-	-

Comments: Extraction method: Mechanical shaking X. fish under stress
None (aqueous solution) –.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	47 mg/l $CaCO_3$	74 mg/l $CaCO_3$
Final	34 mg/l $CaCO_3$	45 mg/l $CaCO_3$	60 mg/l $CaCO_3$	86 mg/l $CaCO_3$

Total Number Dead	
Control	0/20
400 mg/l	13 /20
750 mg/l	20 /20

RESULTS (the checked result applies based on fish survival rates)		
NA	PASSED	LC50 > 750 mg/l (<40% dead in 750 mg/l conc.)
NA	FAILED	≥40% dead in 750 mg/l (close to passing - definitive test recommended)
✓	FAILED	LC50 < 400 mg/l (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12100304-002

Client/ID: TA 440-25017-C-2

TEST SUMMARY

Species: ***Pimephales promelas.***
Fish weight (gm): av: 0.29; min: 0.23; max: 0.34.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	10-4-12 1100			10-5-12 1000				10-6-12 1100				10-7-12 1030				10-8-12 1030			
Analyst:																			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.7	8.2	20.8	8.5	8.0	0	21.0	8.7	7.9	0	20.7	8.7	7.9	0	20.7	8.7	8.0	0
Control B	20.5	8.8	8.2	20.8	8.8	7.8	0	21.0	8.8	7.9	0	20.8	8.8	7.9	0	20.7	8.8	8.0	0
400 mg/l A	20.7	8.7	9.4	20.8	8.3	9.4	0	20.9	8.6	9.3	0	20.7	8.7	9.1	0	20.8	8.6	8.9	0
400 mg/l B	20.7	8.8	9.4	20.8	8.6	9.2	0	21.0	8.7	9.1	0	20.8	8.6	9.3	0	20.8	8.7	8.8	0
750 mg/l A	20.7	8.6	9.5	20.8	8.7	9.2	0	21.0	8.7	9.4	0	20.8	8.7	9.4	0	20.8	8.5	9.2	0
750 mg/l B	20.7	8.7	9.5	20.7	8.8	9.1	0	20.5	8.8	9.6	0	20.8	8.8	9.5	0	20.5	8.6	9.3	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: ~~Yes~~ / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	56 mg/l $CaCO_3$	91 mg/l $CaCO_3$
Final	34 mg/l $CaCO_3$	45 mg/l $CaCO_3$	76 mg/l $CaCO_3$	145 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A1210030 4-003

Client/ID: TA 440-25017-C-3

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.29; min: 0.23; max: 0.34.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	10-4-12 1100			10-5-12 1000				10-6-12 1100				10-7-12 1030				10-8-12 1030			
Analyst:	[illegible]			[illegible]				[illegible]				[illegible]				[illegible]			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.7	8.2	20.8	8.5	8.0	0	21.0	8.7	7.9	0	20.7	8.7	7.9	0	20.7	8.7	8.0	0
Control B	20.5	8.8	8.2	20.8	8.8	7.8	0	21.0	8.4	7.9	0	20.8	8.8	7.9	0	20.7	8.8	8.0	0
400 mg/l A	20.6	8.6	8.8	20.8	8.7	8.8	0	21.1	8.6	8.4	0	20.7	8.7	8.3	0	20.8	8.6	8.3	0
400 mg/l B	20.7	8.7	8.6	20.8	8.6	8.7	0	21.1	8.6	8.3	0	20.8	8.6	8.3	0	20.4	8.6	8.2	0
750 mg/l A	20.6	8.7	8.8	20.8	8.5	8.8	0	21.0	8.5	8.9	0	20.8	8.7	8.4	0	20.8	8.5	8.6	0
750 mg/l B	20.7	8.8	8.9	20.7	8.6	8.8	0	20.9	8.8	8.4	0	20.8	8.8	8.7	0	20.7	8.6	8.7	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.
Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	37 mg/l $CaCO_3$	54 mg/l $CaCO_3$
Final	34 mg/l $CaCO_3$	45 mg/l $CaCO_3$	60 mg/l $CaCO_3$	72 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: AR100304-004

Client/ID: TA 410-25017-C-4

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.29; min: 0.23; max: 0.34.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr			
Date/Time:	10-4-12 1100			10-5-12 1000			
Analyst:							
	°C	DO	pH	°C	DO	pH	# D
Control A	20.5	8.7	8.2	20.8	8.5	8.0	0
Control B	20.5	8.8	8.2	20.8	8.8	7.8	0
400 mg/l A	20.6	8.7	9.2	20.9	8.4	8.5	0
400 mg/l B	20.6	8.8	9.2	20.8	8.4	8.6	0
750 mg/l A	20.6	8.6	9.3	20.8	8.7	8.6	0
750 mg/l B	20.7	8.7	9.4	20.8	8.5	8.7	0

	48 Hr				72 Hr			
Date/Time:	10-6-12 1100				10-7-12 1030			
Analyst:								
	°C	DO	pH	# D	°C	DO	pH	# D
Control A	21.0	8.7	7.4	0	20.7	8.7	7.9	0
Control B	21.0	8.8	7.9	0	20.8	8.8	7.9	0
400 mg/l A	21.2	8.7	8.2	0	20.7	8.4	8.4	0
400 mg/l B	21.1	8.8	8.2	0	20.8	8.5	8.5	0
750 mg/l A	20.9	8.9	8.3	0	20.8	8.7	8.6	0
750 mg/l B	20.0	8.9	8.3	0	20.8	8.7	8.4	0

	96 Hr			
Date/Time:	10-8-12 1030			
Analyst:				
	°C	DO	pH	# D
Control A	20.7	8.7	8.0	0
Control B	20.7	8.8	8.0	0
400 mg/l A	20.8	8.6	8.4	0
400 mg/l B	20.9	8.7	8.4	0
750 mg/l A	20.8	8.5	8.5	0
750 mg/l B	20.8	8.6	8.6	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: ~~Yes~~ / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	44 mg/l $CaCO_3$	60 mg/l $CaCO_3$
Final	34 mg/l $CaCO_3$	45 mg/l $CaCO_3$	60 mg/l $CaCO_3$	72 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS (the checked result applies based on fish survival rates)		
✓	PASSED	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	FAILED	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	FAILED	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

FATHEAD MINNOW HAZARDOUS WASTE SCREEN BIOASSAY

Aquatic Testing Laboratories

Lab No.: A12100304-005

Client/ID: TA 440-25017-C-5

TEST SUMMARY

Species: ***Pimephales promelas***.
Fish weight (gm): av: 0.29; min: 0.23; max: 0.34.
Reference Toxicant: SDS conducted monthly.
Test chamber volume: 10 liters.
Temperature: 20 +/- 2°C.
Aeration: none, unless D.O. drops below 5.0 mg/l.
Number of replicates: 2.
Dilution water: Soft reconstituted water (40-48 mg/l $CaCO_3$).

Source: In-Lab Culture.
Regulations: CCR Title 22.
Test Protocol: California F&G/DHS 1988.
Endpoints: Survival at 96 hrs.
Test type: Static.
Feeding: None.
Number of fish per chamber: 10.
Photoperiod: 16/8 hrs light/dark.

TEST DATA

	INITIAL			24 Hr				48 Hr				72 Hr				96 Hr			
Date/Time:	10-4-12 1100			10-5-12 1100				10-6-12 1100				10-7-12 1030				10-8-12 1030			
Analyst:																			
	°C	DO	pH	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D	°C	DO	pH	# D
Control A	20.5	8.7	8.2	21.0	8.5	8.0	0	21.0	8.7	7.9	0	20.7	8.7	7.9	0	20.7	8.7	8.0	0
Control B	20.5	8.8	8.2	20.8	8.8	7.8	0	21.0	8.8	7.9	0	20.8	8.8	7.9	0	20.7	8.8	8.0	0
400 mg/l A	20.7	8.6	9.4	20.9	8.8	9.2	0	21.2	8.6	8.5	0	20.7	8.6	8.4	0	20.8	8.7	8.2	0
400 mg/l B	20.7	8.7	9.4	20.9	8.9	9.2	0	21.1	8.8	8.2	0	20.8	8.7	8.4	0	20.9	8.8	8.2	0
750 mg/l A	20.6	8.7	9.5	20.8	8.7	9.1	0	20.9	8.6	8.3	0	20.4	8.8	8.3	0	20.9	8.6	8.3	0
750 mg/l B	20.6	8.7	9.5	20.7	8.8	9.0	0	20.3	8.8	8.3	0	20.4	8.7	8.3	0	20.8	8.6	8.3	0

Comments: Extraction method: Mechanical shaking X.
None (aqueous solution) —.

Dissolved Oxygen (DO) readings in mg/l O_2. Test Aerated: Yes / No

	CONTROL		HIGH CONCENTRATION	
	Alkalinity	Hardness	Alkalinity	Hardness
Initial	33 mg/l $CaCO_3$	44 mg/l $CaCO_3$	47 mg/l $CaCO_3$	64 mg/l $CaCO_3$
Final	34 mg/l $CaCO_3$	45 mg/l $CaCO_3$	64 mg/l $CaCO_3$	95 mg/l $CaCO_3$

Total Number Dead	
Control	0 /20
400 mg/l	0 /20
750 mg/l	0 /20

RESULTS
(the checked result applies based on fish survival rates)

✓	**PASSED**	**LC50 > 750 mg/l** (<40% dead in 750 mg/l conc.)
NA	**FAILED**	**≥40% dead in 750 mg/l** (close to passing - definitive test recommended)
NA	**FAILED**	**LC50 < 400 mg/l** (>60% dead in 400 mg/l conc.)

TestAmerica Irvine
17461 Derian Ave Suite 100
Irvine, CA 92614-5817
Phone (949) 261-1022 Fax (949) 260-3297

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Harris, Amy	Carrier Tracking No(s):	COC No: 440-12207.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: amy.harris@testamericainc.com		Page: Page 1 of 1
Company: Aquatic Testing Laboratories		Analysis Requested		Job #: 440-25017-1
Address: 4350 Transport #107, ,	Due Date Requested: 10/9/2012			Preservation Codes:
City: Ventura	TAT Requested (days):			
State, Zip: CA, 93003				
Phone:	PO #:			
Email:	WO #:			
Project Name: Waste to Energy	Project #: 44006380			
Site:	SSOW#:			Other:

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA

M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)		SUBCONTRACT/ Bioassay Haz Waste	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
W10-daily comp-091712 (11:35) (440-25017-1)	9/28/12	11:35 Pacific		Solid			X		
W10-daily comp-091812 (11:40) (440-25017-2)	9/28/12	11:40 Pacific		Solid			X		
W10-daily comp-091912 (11:45) (440-25017-3)	9/28/12	11:45 Pacific		Solid			X		
W10-daily comp-092012 (11:50) (440-25017-4)	9/28/12	11:50 Pacific		Solid			X		
W10-daily comp-092112 (11:55) (440-25017-5)	9/28/12	11:55 Pacific		Solid			X		

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by:	Date/Time: 10-3-12 9:20	Company	Received by:	Date/Time: 10-3-12 9:20	Company
Relinquished by:	Date/Time: 10-3-12 13:20	Company	Received by:	Date/Time: 10-3-12 1320	Company AT
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 1.6

Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614
phone 949.261.1022 fax 949.260.3299

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Client Contact	Project Manager: Steve Madoski 277-1411	Site Contact: Cat McDonald 277-1431	Date: 09-28-2012	COC No: 8
Steve Madoski	Tel/Fax:	Lab Contact: Maung Thein 277-9648	Carrier: FedEx	____ of ____ COCs
Address	Analysis Turnaround Time			Job No. 440-25017
Edwards AFB	Calendar (C) or Work Days (W) 10 Day			
661-277-1411 Phone	TAT if different from Below ______			SDG No.
(xxx) xxx-xxxx FAX	☐ 2 weeks			
Project Name: Waste to Energy	☐ 1 week			
Site: LandFill	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Container Type	Matrix	# of Cont.	Filtered Sample	Cam 17 metals + Mercury	Dioxins and Furans	Haz Waste Bioassay	Sample Specific Notes:
W10-daily comp-091712	9/28/2012	1135	Glass Jar	solid	3		X	X	X	
W10-daily comp-091812	9/28/2012	1140	Glass Jar	solid	3		X	X	X	
W10-daily comp-091912	9/28/2012	1145	Glass Jar	solid	3		X	X	X	
W10-daily comp-092012	9/28/2012	1150	Glass Jar	solid	3		X	X	X	
W10-daily comp-092112	9/28/2012	1155	Glass Jar	solid	3		X	X	X	
										OO 10/2/12 14:30

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ______

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For ______ Months

Special Instructions/QC Requirements & Comments: Ronald Czarnecki(661-277-7167)
Refer to COC for Sample ID's. Sample ID's on jars incomplete.

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	JT3/CH2MHILL	9/28/12 1300	[signature]	JT3	9-28-2012 13:00
[signature]	JT3	9-28-12 14:00			
			[signature]	TAI	10/1/12 0920

Form No. CA-C-WI-002, dated 04/07/2011

10/24/2012

Login Sample Receipt Checklist

Client: JT3 LLC

Job Number: 440-25017-1

Login Number: 25017

List Source: TestAmerica Irvine

List Number: 1

Creator: Escalante, Maria

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

Appendix F: Air Emissions Analysis

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Test Report

Compliance Test
For One Diesel Generator Engine
IST Energy
Edwards Air Force Base, California

Prepared for:

IST Energy
303 Bear Hill Road
Waltham, MA 02451

Submitted to:

Eastern Kern Air Pollution Control District
2700 M Street Suite 302
Bakersfield, California 93301

Publication Date: **October 11, 2012**

Prepared by:

TRC Companies, Inc.
2820 Pegasus Drive, Suite 1
Bakersfield, California 93308

COMPLIANCE VERIFICATION DATA SUMMARY

Client: IST Energy
Test Date: 12-Sep-12 **Source:** Diesel Generator

PARAMETER	gr S/100 scf	ppm(v)	ppm(v) @ 15% O	lbs/hr	g/bhp-hr	lbs/day
PM-10						
Run 1				0.007	0.079	
2				0.007	0.086	
3				0.008	0.088	
Mean				0.007	0.085	
District Permit Limit						
Pass/Fail						
NO_x as NO_2, dry						
Run 1						
2		236	82.2	0.24		5.74
3		328	114	2.773		8.48
Mean		310	113	0.35		7.95
District Permit Limit		292	103	4.094		7.39
Pass/Fail				0.33		
CO				3.839		
Run 1				0.31		
2				3.568		
3						
Mean		2.61	0.91	0.002		0.04
District Permit Limit		62.2	21.5	0.019		0.98
Pass/Fail		139	50.7	0.04		2.17
SO_2		67.9	24.4	0.472		1.06
Run 1				0.09		
District Permit Limit				1.046		
Pass/Fail				0.04		
				0.512		
VOC (C_3-C_{6+})	0.64	11.00				
Run 1						
2						
3						
Mean						
District Permit Limit		6.35	2.56	0.002		0.05
Pass/Fail		224	88.8	0.022		1.70
		273	114	0.07		2.06
		168	68.5	0.821		1.27
				0.09		
				0.993		
				0.05		
				0.612		

Comments:

For Regulatory Agency Use Only:

COMPLIANCE TEST

FOR ONE DIESEL GENERATOR ENGINE

IST ENERGY

EDWARDS AIR FORCE BASE, CALIFORNIA

Report Certification

I certify that to the best of my knowledge:

- Testing data and all corresponding information have been checked for accuracy and completeness.
- Sampling and analysis have been conducted in accordance with the approved protocol and applicable reference methods (as applicable).
- All deviations, method modifications, or sampling and analytical anomalies are summarized in the appropriate report narrative(s).

Jim Pelkin

Insert name
TRC Project Manager

10-12-12

Date

TRC was operating in conformance with the requirements of ASTM D7036-04 during this test program.

J W Burdette

Jeffrey W. Burdette
TRC Air Measurements Technical Director

COMPLIANCE TEST

FOR ONE DIESEL GENERATOR ENGINE

IST ENERGY

EDWARDS AIR FORCE BASE, CALIFORNIA

GENERAL INFORMATION

Source Owner:	IST Energy 303 Bear Hill Road Waltham, MA 02451
Corporate Contact:	Mr. Matt Young Telephone: (781) 890-1338 Ext. 277
Test Location:	Landfill Site Edwards Air Force Base, CA 93524
Source Description:	One John Deere 6068H Diesel Engine Model: 6068HF285 Turbocharged and air-to-air aftercooled
Cognizant Agency:	Eastern Kern APCD 2700 M Street Suite 302 Bakersfield, CA 93301
Source Test Contractor:	TRC Companies, Inc. 2820 Pegasus Drive, Suite 1 Bakersfield, CA 93308
Contact:	Mr. Jim Polhamus (661) 399-1398 ext 8152
Test Dates:	September 12, 2012

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1.0 INTRODUCTION

On September 12, 2012, TRC Companies, Inc. (TRC), Bakersfield, California, conducted source test on one John Deere diesel generator engine, Model 6068HF285, turbocharged and air-to-air aftercooled, which is operated by IST Energy and located in Edwards Air Force Base, California. The diesel engine is used to burn off a waste gas from a Waste to Energy unit that is burning landfill waste formed into pellets. The generator energy is designed to power remote sites.

~~Testing Procedures~~

CEM testing consisted of three 60-minute test runs, for compliance determination on the engine stack while the unit operated at normal production limits. The following EPA Methods were performed: EPA Method 3A (O_2/CO_2), EPA Method 6C (SO_2), EPA Method 7E (NO_X), and EPA Method 10 (CO). Table 1-1 summarizes the test program.

In addition, triplicate 60-minute test runs for particulate (PM) determination using EPA Method 1A (Sample and Velocity Traverses for Small Stacks or Ducts) and ARB Method 5 (Particulate) were performed on the engine. Hydrocarbon testing consisted of triplicate 60-minute canister sampling using SCAQMD Method 25.3 (VOC) were performed on the engine. Fuel sulfur content was determined utilizing EPA Method 19 (GC-FPD). In addition to the compliance testing, a sample of diesel fuel and waste gas was collected and analyzed for carbon (C), hydrogen (H), oxygen (O_2), nitrogen (N_2), sulfur (S), heat content (Btu), and heating value in accordance with ASTM D240, ASTM D5373, ASTM D1945, and ASTM D3588. Sulfur emissions were determined from the diesel fuel sulfur and waste gas fuel sulfur content in accordance with ASTM D3120 and ASTM D3246.

IST Energy representative, Mr. Matt Young, coordinated activities for the facility and was responsible for supplying TRC with facility operating data. The TRC test team was comprised of Mr. Jim Polhamus (Project Manager), Mr. Jeff S. Harris (field testing, data reduction, and report writing), Mr. Xavier Gonzales (field testing and data reduction), and Mr. Lou Villaruz (lab Manager and lab analysis).

TABLE 1-1

TESTING MATRIX

Test Condition	No. of Runs	Sample Type (Pollutant)	Sampling Method	Test Time
Normal	3	Flow	EPA Method 1A &am	60 minutes
	3	Moisture	EPA Method 4	60 minutes
	3	PM	ARB Method 5	60 minutes
	3	O_2/CO_2	EPA Method 3A	60 minutes
	3	SO_2	EPA Method 6C	60 minutes
	3	NO/NO_x	EPA Method 7E	60 minutes
	3	CO	EPA Method 10	60 minutes
	3	VOC	SCAQMD Method 25.3	60 minutes

TABLE 1-2
TESTING SPECIFICS

Sample Type	Analytical Lab	Units of Measurement	Minimum Detection Limit	Anticipated Range
O_2/CO_2		%	0.1 %	0-25%
SO_2		ppmvd, ppmvd @ 15% O_2, lb/hr	0.1 ppm	0- 100 ppm
NO/NO_X		ppmvd, ppmvd @ 15% O_2, lb/hr	0.1 ppm	0-500 ppm
CO		ppmvd, ppmvd @ 15% O_2, lb/hr	0.1 ppm	0-20 ppm 0-5,000 ppm
VOC		ppmvd, ppmvd @ 15% O_2, lb/hr	0.1 ppm	0-100 ppm
PM	TRC	gr/dscf, lb/hr, lb/day	-	-
Fuel Sample	Zalco	% CHONS, Btu/lb, Fuel Sulfur	-	-

2.0 SUMMARY OF RESULTS

The following tables present the parameters and emission data measured by TRC at IST Energy on September 12, 2012. Unit emissions measurements were taken from the exhaust gases of the diesel fuel fired generator engine. All calculations and raw data are located in the Appendices.

Table 2-1 presents the compliance emission data for the generator engine, respectively. Table 2-2 summarizes representative emission factors on an emission per unit of fuel-consumed basis. Table 2-3 presents the Particulate compliance emission data. The emissions for each parameter are reported in units of parts per million volume dry (ppmvd), ppmvd @ 15% (O_2), % (for O_2/CO_2), pounds per hour (lb/hr), pounds per day (lb/day), and grains per dry standard cubic foot (gr/dscf). The emission data contained in these Tables are reported at 60ºF and 29.92 "Hg standard conditions.

TABLE 2-1

COMPLIANCE TEST DATA SUMMARY

GENERATOR ENGINE STACK

IST ENERGY

EDWARDS AIR FORCE BASE, CALIFORNIA

SEPTEMBER 12, 2012

Parameter	Run 1	Run 2	Run 3	Average
Oxygen (O_2)				
%	3.95	3.86	4.73	4.18
Nitrogen Oxides (NO_x)				
ppm	236	328	310	292
ppm @ 15% Oxygen	82.2	114	113	103
lb/hr	0.24	0.35	0.33	0.31
lb/day	5.74	8.48	7.95	7.39
g/bhp-hr	2.773	4.094	3.839	3.568
Carbon Monoxide (CO)				
ppm	2.61	62.2	139	67.9
ppm @ 15% Oxygen	0.91	21.5	50.7	24.4
lb/hr	0.00	0.04	0.09	0.04
lb/day	0.04	0.98	2.17	1.06
g/bhp-hr	0.019	0.472	1.046	25.474
Carbon Dioxide (CO_2)				
%	13.91	14.79	13.97	14.22
lb/hr	135	152	143	143
lb/day	3,240	3,656	3,424	3,440
Sulfur Dioxide (SO_2)				
ppm	17.8	14.3	27.9	20.0
ppm @ 15% Oxygen	6.18	4.96	10.19	7.11
lb/hr	1.59	1.29	2.51	1.80
lb/day	38.3	30.9	60.2	43.1
g/bhp-hr	18.466	14.898	29.067	20.810
Volatile Organic Compounds (TNMOC, as Carbon)				
ppmvd as Carbon	7.34	256	313	192
lb/hr as Carbon	0.002	0.07	0.09	0.053
g/bhp-hr	0.022	0.821	0.993	0.612

TABLE 2-2
REPRESENTATIVE EMISSION FACTORS SUMMARY
GENERATOR ENGINE STACK
IST ENERGY
EDWARDS AIR FORCE BASE, CALIFORNIA
SEPTEMBER 12, 2012

Parameter	Run 1	Run 2	Run 3	Average
Operating Data				
Exhaust Gas Flow Rate (dscfm)	139	148	147	145
Diesel Fuel				
Fuel Gas F-Factor	8,861	8,861	8,861	8,861
Fuel Sulfur Content (ppm)	11	11	11	11
Fuel Gas Calorific Value (GCV, BTU/lb)	19,820	19,820	19,820	19,820
Waste Fuel				
Fuel Gas F-Factor	12,764	12,764	12,764	12,764
Fuel Sulfur Content (ppm)	11	11	11	11
Fuel Gas Calorific Value (GCV, BTU/lb)	2,175	2,175	2,175	2,175

TABLE 2-3

PARTICULATE COMPLIANCE DATA SUMMARY

GENERATOR ENGINE STACK

IST ENERGY

EDWARDS AIR FORCE BASE, CALIFORNIA

SEPTEMBER 12, 2012

Parameter	Run 1	Run 2	Run 3	Average
Particulate Matter<10 Micr				
gr/dscf	0.0057	0.0059	0.0061	0.0059
lb/hr	0.007	0.007	0.008	0.007
dscfm	139	148	147	145
g/bhp-hr	0.079	0.086	0.088	0.085

3.0 METHODOLOGY

~~Testing Methodology~~

TRC conducted this testing program using the following approved methods:

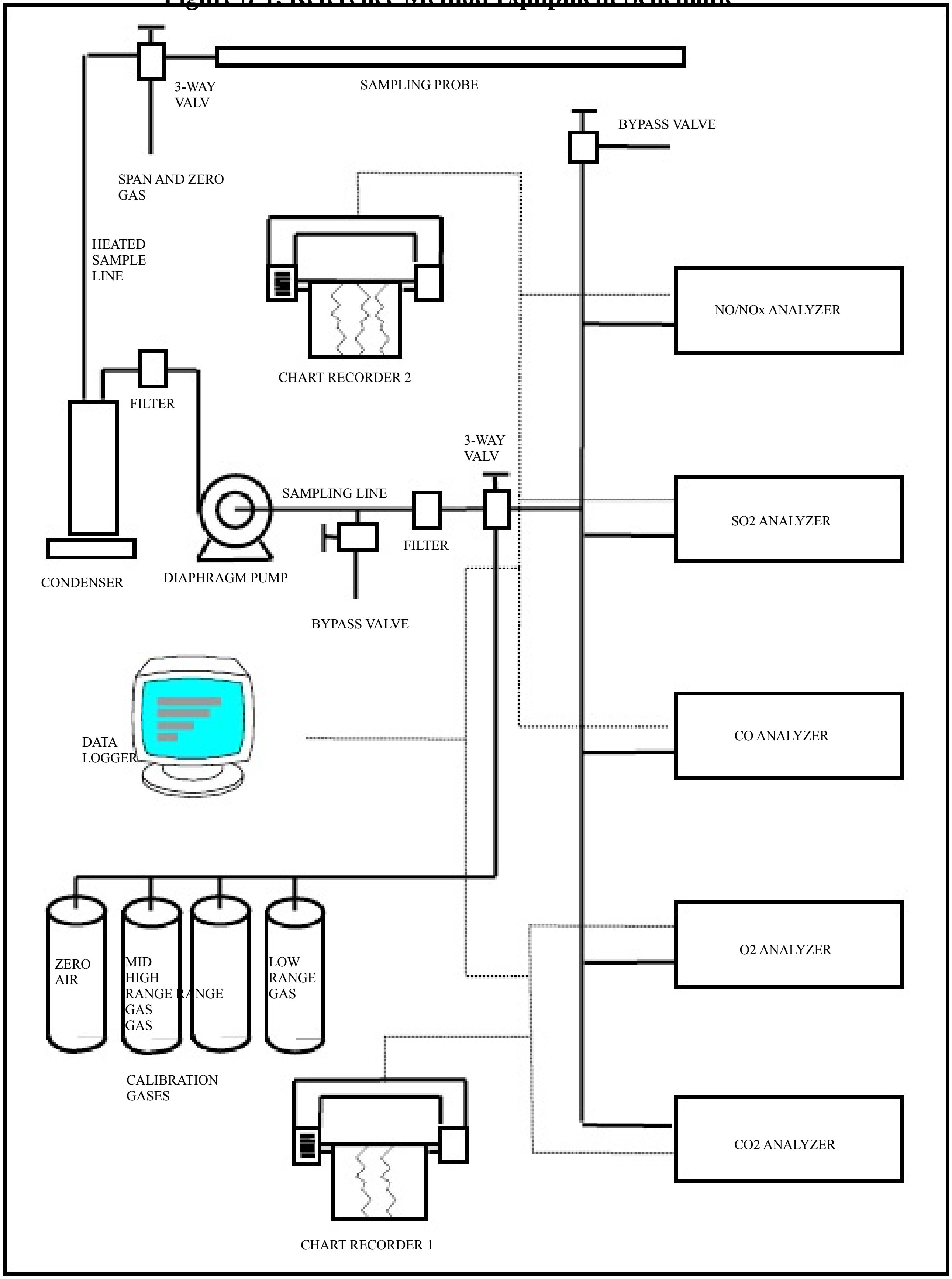
Velocity Point Location ....EPA Method 1
Flow rate ....EPA Method 2
Moisture Content ....EPA Method 4
Particulate Matter ....ARB Method 5
CO_2/ O_2..EPA Method 3A
SO_2..EPA Method 6C
NO/NO_X...EPA Method 7E
CO ....EPA Method 10
Volatile Organic Compound ....SCAQMD Method 25.3

Samples were collected through a stainless steel probe inserted into the outlet stack through sample ports provided. Sample gas were delivered through a sample conditioning and delivery system comprised of an insulated heated, 0.375" OD Teflon sample line, condenser (Universal Analyzer equipped with two Peltier Effect cooled stainless steel condensers for moisture removal), Balston filter (for particulate removal), and a pump, all located near testing platform at the stack. A Teflon tube, 0.375" OD was used to deliver sample from near the platform to the testing van where a manifold system was used for sample distribution to the continuous analyzers. A schematic of the continuous emissions sampling and monitoring system is presented in Figure 2-1. The instrument analog outputs were 0-1 VDC, 0-5 VDC, and 0-10 VDC. The outputs were connected to a chart recorder and data acquisition system.

The gaseous parameters monitored through the use of continuous monitors were O_2, CO_2, SO_2, NO_X, and CO. The instruments were calibrated and operated in accordance with CARB and EPA Reference Methods.

Prior to emission testing, several calibration checks were performed. Initial calibration of the sampling system, calibration error check, leak check, response check, NO_2

Figure 3-1. Reference Method Equipment Schematic



convertor check, and sample bias check was performed for each analyzer. Pretest sampling system bias check were performed by alternately introducing at the three-way valve zero or upscale calibration gas, whichever calibration gas is closest in concentration to the sample gas. If the difference of zero or upscale calibration gas measured between the calibration error check and sample system bias check is greater than ±5% of the range of either zero or upscale calibration gas, the bias check is invalid. Between each test run, the monitoring systems was checked for zero and span drift by alternately introducing zero and upscale calibration gas through the entire sample delivery system using a three way valve installed at the probe. If the analyzer drift is greater than ±3% of the range of either zero or upscale calibration gas for post and initial run sampling system bias check, the run will be repeated. If the difference of zero or upscale calibration gas measured for the post run sampling system bias check is greater than ±5% of the range, the run will be repeated. Corrective action will be performed if needed before starting next run. At the beginning and the conclusion of the test day, a sample delivery system leak check was performed.

The analyzers were calibrated with two concentrations of span gas plus zero gas. The calibration gases for each parameter (i.e. O_2, CO_2, SO_2, NO_X, and CO) were currently certified EPA Protocol 1 gases.

Oxygen (EPA Method 3A)

Oxygen was continuously recorded using a Servomex, Model 1440 analyzer employing the paramagnetic method of detection. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	&l2% of chart
Span Drift	&l2% of full-scale
Response Time	&l1 minute
Sample Residence Time	&l2 minutes
Instrument full-scale	0-25% (v/v)

Carbon Dioxide (EPA Method 3A)

Carbon dioxide was measured with a Servomex, Model 1440 analyzer using the NDIR method of detection. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	&l2% of full-scale
Span Drift	&l2% of span value
Response Time	&l2 minutes
Sample Residence Time	&l2 minutes
Instrument full-scale	0-25% (v/v)

Sulfur Dioxide (EPA Method 6C)

Sulfur dioxide was continuously recorded using a Bovar, Model 721M. The instrument employs the ultra-violet method of detection. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	≤2% of full scale
Span Drift	2% of full scale
Sample Bias Check	≤5% of span gas value
Response Time	≤1 minute
Sample Residence Time	≤1 minute
Instrument full-scale	0-100 ppm (v/v)

Nitrogen Oxides (EPA Method 7E)

Nitrogen oxides were monitored with an API Model 200 AH, Chemiluminescent Analyzer. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	&l2% of full-scale
Span Drift	&l2% of span value
Response Time	&l2 minutes

Sample Residence Time	&l2 minutes
Instrument full-scale	0-250 ppm (v/v)
NO_2 to NO Conversion	≥90%

Carbon Monoxide (EPA Method 10)

Carbon monoxide was continuously measured and recorded using a Teledyne, Model T300 analyzer using gas filter correlation with NDIR as the method of detection. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	&l2% of chart
Span Drift	&l2% of full-scale
Response Time	&l1 minute
Sample Residence Time	&l1 minute
Instrument full-scale	0-50 ppm (v/v)

Carbon Monoxide (EPA Method 10)

Carbon monoxide was continuously measured and recorded using a California Analytical Instrument, Model ZRH analyzer using gas filter correlation with NDIR as the method of detection. The analyzer was multi-point calibrated before the testing program and system bias checked before and after each test run. The following criteria cover instrument operation:

Zero Drift	&l2% of chart
Span Drift	&l2% of full-scale
Response Time	&l1 minute
Sample Residence Time	&l1 minute
Instrument full-scale	0-5,000 ppm (v/v)

Data Recording System

A Linseis, Model L7045, chart recorder and strata Data Acquisition System continuously recorded measurements from all monitors.

Traverse Point Location (EPA Method 1A)

The procedures specified by EPA Method 1A, "Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts", was followed to determine the number and location of the traverse points used for the stack tested. The number of straight run stack diameters (equivalent diameters) upstream and downstream from the sample ports was measured and these measurements were used to determine the minimum number of traverse points required for monitoring exhaust gas flow.

Stack Gas Velocity and Volumetric Flow Rate (EPA Method 2)

The procedures delineated by EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type Standard Pitot Tube)," were followed to determine the stack gas velocity and volumetric flow rate. From the results of the measurements taken in the preceding section to determine the number and location of traverse points, a velocity and temperature traverse was conducted for each test run. A type-standard Pitot tube and K-Type thermocouple was positioned at each traverse point and the appropriate data recorded on a data sheet. The Pitot tube was connected to an inclined oil manometer and the thermocouple was connected to Omega 601 digital temperature readout. The Pitot tube, thermocouple and readout devices was calibrated prior to and after field use.

Determination of Moisture Content (EPA Method 4)

A gas sample was extracted at a constant rate from the source. Moisture was then removed from the sample stream and determined gravimetrically.

The sample probe was constructed of glass tubing. The moisture condenser consisted of four impingers connected in series. The first, third, and fourth impingers were of the modified Greenburg-Smith design with open ends. The second impinger was the Greenburg-Smith design with the standard tip. The first two impingers contained 100 ml of water, the third was empty, and the fourth contained approximately 200 grams of silica gel. An ice bath container and crushed ice were used to aid in condensing moisture. The metering system included a vacuum gauge, leak-free pump, thermometers, and dry gas meter.

Prior to sampling, a leak check of the system was conducted at 15 inches Hg vacuum. During sampling, a constant sample rate was maintained throughout the test run. A post-test

leak check of the system was performed at the highest vacuum observed during the test to validate the test run. Leakage rates were less than 4 percent of the average sampling rate or 0.02 CFM, whichever was less, to be acceptable.

~~Particulate Matter (ARB Method 5)~~

~~General~~

Particulate matter testing was conducted in accordance with ARB Method 5 guidelines published by Air Resources Board Method. Particulate matter was withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 248 + 25 ºF. Material collected at or above the filtration temperature was determined gravimetrically after removal of uncombined water. This filterable particulate mass was defined as the combined mass of the nozzle and probe washings (FHW) and the glass fiber filter.

Isokinetic sampling was performed using a calibrated nozzle. The filter holder was heated and contained a tared 83-mm Whatman 934 AH glass fiber filter. The impinger train was kept in an ice bath. Impingers 1 and 2 contained 100 milliliters of distilled water, impinger 3 was empty, and impinger 4 contained a tared amount of silica gel. The impingers were weighed before and after sampling to allow calculation of percent moisture in the gas stream. The probe and sample box were connected to the control module using an umbilical line. The control module consisted of a vacuum pump, a calibrated dry gas meter, and a calibrated orifice meter. The control module components measured pressure, temperature, and flow rate throughout the train.

~~Sampling Procedure~~

A leak check was performed before sampling begins by heating the sample train and bringing it to 15-inches of mercury vacuum. Leakage was less than 0.02 cfm of the average sampling rate prior to beginning each test. A leak check was also performed on the Standard-type Pitot tube. The stack was then traversed using the predetermined test point locations in each test port. An isokinetic-sampling rate was established for each test point throughout the test. After sampling was complete, a final leak check was performed on both the train and Standard-type Pitot tube. This leak check was performed at the highest vacuum

achieved during the test. All pertinent data was recorded on field data sheets shown in the Report Appendix.

Sample Recovery

The nozzle, probe, and the front half of the 83-mm filter holder (FHW) were brushed and rinsed with ACS reagent grade acetone. The rinses were collected into a labeled gas sample bottle. The 83-mm filter was carefully removed and placed back into its labeled petri dish and sealed. Each impinger was removed from the ice bath, wiped dry, and weighed to allow calculation of percent moisture in the gas stream. A chain-of-custody form was filled out with sample numbers for tracking purposes.

Sample Analysis for Particulate

The FHW volume was measured, carefully transferred to a clean, tared, aluminum-weighing dish, and evaporated to dryness. The dish containing the FHW dried residue was placed in a desiccator and weighed at 6-hour intervals until a constant weight was achieved.

The 83-mm Quartz filter was carefully removed from its petri dish and dried in the oven at 105 ºC for 2 hours to remove the uncombined water. The filter was then desiccated and weighed at 6-hour intervals until a constant weight is achieved.

Condensable particulate was analyzed for condensable particulate. The volume of the BHW bottle was measured, carefully transferred to a clean, tared, glass-weighing dish, and evaporated to dryness. The dish containing the BHW dried residue was placed in a desiccator and weighed at 6-hour intervals until a constant weight was achieved.

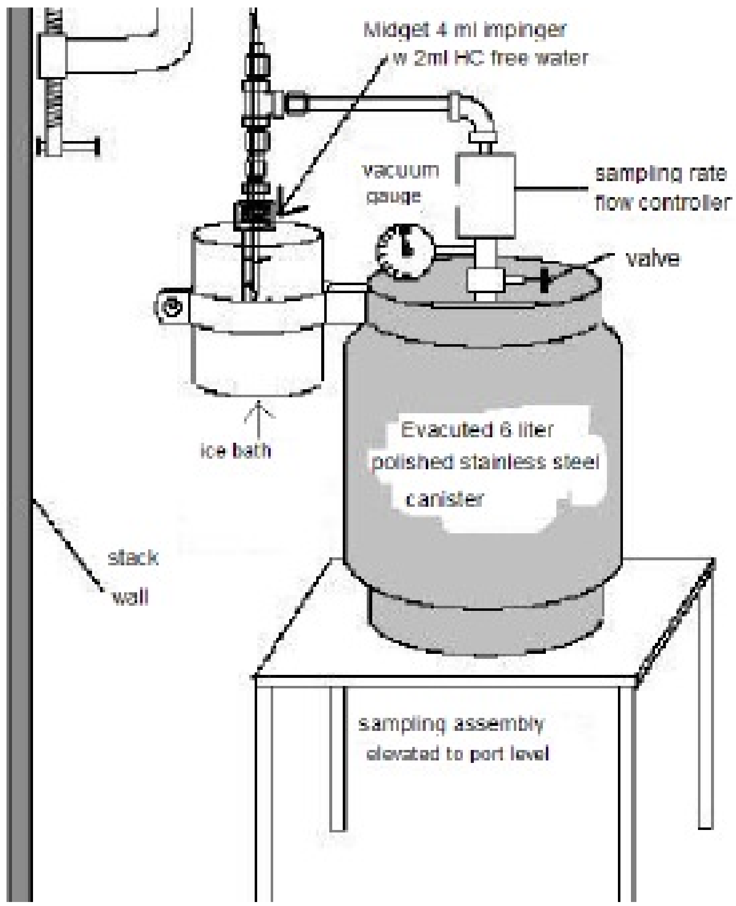
A blank for each particulate portion was handled in a similar manner in order to blank correct the data and for Quality Assurance.

VOC (SCAQMD Method 25.3)

The sample was withdrawn from the stack through a stainless steel probe connected to a stainless steel filter. This probe had a continuous connection to the tip of a midget impinger containing 2 ml of hydrocarbon free water. The impinger was immersed in a container holding crushed ice and water that was maintained throughout the duration of the sampling. The sample then continued through to the canister. The flow rate of the sample

through the sampling assembly was controlled by a sample rate flow controller. At the end of the sampling period, the midget impinger containing 2 ml of hydrocarbon free water was recovered and placed immediately into an ice chest for storage for shipment to the laboratory. The canister contents were analyzed by GC/FID and the impinger contents were analyzed by TCA (NDIR).

Figure 3-2 SCAQMD Method 25.3 VOC Sampling Schematic



~~Composition Heating and Sulfur (EPA Method 19)~~

IST Energy personnel during the source testing program collected a sample of diesel fuel. The sample was collected into a 500 liter glass sampling container. The diesel fuel was collected at the fuel supply tank to the engine. The fuel sample was submitted to Zalco A sample of waste gas was collected into a 5 liter Tedlar Bag. The gas was collected at the supply line to the diesel engine. The fuel sample was submitted to TRC Laboratory, Bakersfield, California for analysis of fuel composition and heating value as specified by ASTM D1945 and ASTM D3588. Fuel sulfur of the waste gas was submitted to Zalco Laboratories, Bakersfield, California, for analysis specified by ASTM D3246. Laboratories, Bakersfield, California, for analysis of fuel composition and heating value as specified by ASTM D240 and ASTM D5373. Fuel sulfur analysis of fuel for composition value was specified by ASTM D3120.

4.0 QUALITY CONTROL

The report was reviewed for technical and editorial quality and for compliance with project requirements. Computer programs designed for source testing performed calculations. At least one set of calculations was performed manually to check results.

All equipment used in testing has been checked for proper maintenance and calibrated prior to testing. Test equipment calibrations are included in the Report Appendix. The dry gas meter accuracy is expressed as gamma and is determined as the difference between the meter box dry gas meter and the wet test meter used for calibration. The results of the orifice calibration are expressed as the delta H@ (dH@) at various pressure drops (inches of water), as specified in EPA publication APTD-0576. EPA Quality Assurance Branch annual audits are performed with an orifice check of each of the dry gas meters used for volumetric sampling.

All field samples were labeled and logged in on a chain-of-custody sheet. Chain-of-custody sheets remained with samples and document sample movement.

The analyzers employed for continuous monitoring of O_2, CO_2, SO_2, NO_X, and CO were California Air Resources Board (CARB) approved instruments. Sampling system bias checks of the continuous monitor sampling system were performed using either EPA Protocol 1 or NIST certified calibration gases. Calibration certificates are included in the Report Appendix. All other required checks of the continuous monitor system were also performed.

NOMENCLATURE

A_s	=	Cross-sectional area of stack (ft^2)
A_n	=	Cross-sectional area of nozzle (ft^2)
B_{ws}	=	Water vapor in the gas stream, proportion by volume (dimensionless)
C_p	=	Pitot tube coefficient (dimensionless)
dH	=	Average pressure differential across the orifice meter (inches of water)
Md	=	Dry molecular weight of stack gas (lb/lb-mole)
Ms	=	Wet molecular weight of stack gas (lb/lb-mole)
N	=	Normality of titrant (milliequivalents/ml)
dP	=	Velocity pressure of stack gas (inches of water)
Pb	=	Barometric pressure at sampling site (in. Hg)
Ps	=	Absolute stack gas pressure (in. Hg)
Pstd	=	Standard absolute pressure (29.92 in. Hg)
Qs(std)	=	Dry volumetric stack gas flow rate, standard conditions (dscfm)
Ts	=	Stack temperature (ºF)
Vm	=	Dry gas volume as measured by dry gas meter (dcf)
Vm(std)	=	Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)
Vw(std)	=	Volume of water vapor in the gas stream, corrected to standard conditions (scf)
Vlc	=	Volume of water vapor condensed in impingers and silica gel (ml)
T(std)	=	Standard temperature (ºF)
Tm	=	Meter temperature (ºF)
SQ.RT.dP	=	Square root of velocity pressure (dimensionless)
y	=	Dry gas meter calibration factor (dimensionless)
Pstatic	=	Static pressure of stack (in. H_2O)
Pstack	=	Static pressure of stack (in. Hg)
I	=	Isokinetic sample rate (percent)
vs	=	Average velocity of the stack gas (ft/sec)
Qs	=	Actual stack gas flow rate at stack conditions (ft^3/min)
Θ	=	Total sampling time (min)
% O_2	=	Percent oxygen by volume (dry basis)
% CO_2	=	Percent carbon dioxide by volume (dry basis)
% CO	=	Percent carbon monoxide by volume (dry basis)
% N_2	=	Percent nitrogen by volume (dry basis)
Zcf	=	Zero drift correction factor
Scf	=	Span drift correction factor
Cz	=	Zero correction concentration
MW	=	Molecular weight (lb/lb-mole)
ppm	=	Parts per million by volume
lb/MMBtu	=	Emission concentration, pounds per million British thermal units

dscf/MMBtu	=	Fuel factor, dry standard cubic feet per million British thermal units
gr/scf	=	Emission concentration, grains per standard cubic foot
lb/hr	=	Emission rate, pounds per hour
FHW	=	Front Half Wash of sampling train
MF	=	Mass Filter of sampling train
BHW	=	Back Half Wash of Sampling train
gr/dscf	=	Emission concentration, grains per dry standard cubic foot
ng	=	Mass unit, nanograms
mg	=	Mass unit, milligrams
g	=	Mass unit, grams
ml	=	Unit of volume, milliliters
L	=	Unit of volume, liters
ul	=	Unit of volume, microliters
H_2SO_4	=	Chemical formula, sulfuric acid
$BaCl_2$	=	Chemical formula, barium chloride
NaOH	=	Chemical formula, sodium hydroxide
H_2S	=	Chemical formula, hydrogen sulfide
FHS	=	Front Half Sulfate of sampling train
BHS	=	Back Half Sulfate of sampling train
F-Factor	=	Fuel factor, volume of generated gases per unit of heat content (dscf/MMBtu)
ºF	=	Degrees Fahrenheit
ºR	=	Degrees Rankine
ºC	=	Degrees Celsius
98.076	=	Molecular weight of sulfuric acid
64.062	=	Molecular weight of sulfur dioxide
46.006	=	Molecular weight of nitrogen dioxide
28.010	=	Molecular weight of carbon monoxide
60	=	Conversion factor, minutes per hour
460	=	Conversion factor, ºF to ºR
15.432	=	Conversion factor, grains per gram
0.000143	=	Conversion factor, pounds per grain
32/98.076	=	Conversion factor, equivalent weight of SO_2 to MW of H_2SO_4
1.60982	=	Ideal Gas Law (lb-mole x dscf/dscf/ºR x mg)
0.00000137	=	Ideal Gas Law (lb-mole x ºR/ft^3)
0.280	=	Molecular weight of N_2 or CO, divided by 100
0.320	=	Molecular weight of O_2, divided by 100
0.440	=	Molecular weight of CO_2, divided by 100
18.0	=	Molecular weight of H_2O
32.064	=	Equivalent weight of SO_2
85.49	=	Pitot tube constant, ft/sec x [(lb/lb-mole) x (in.Hg)/((ºR) x (in.$H_2$0))]$^{0.5}$
8.223E-05	=	Ideal gas constant (1.37E-06 lb-mole ºR/ft^3) x (60 min/hr)

Emission Calculations
Gas Components

Client: IST Energy **Date:** 12-Sep-12
Source: Diesel Generator

Parameter	Run 1	Run 2	Run 3	Average
Oxygen (%)	3.95	3.86	4.73	4.18
Qs(std) dscfm	139	148	147	145
Brake Horsepower Hour	39.16	39.16	39.16	39.16

Calculations

Nitric Oxide (NO_x)				
ppm, dry	236	328	310	292
ppm @ 15% O2	82.2	114	113	103
lb/hr	0.24	0.35	0.33	0.31
lb/day	5.74	8.48	7.95	7.39
gr/bhp-hr	2.773	4.094	3.839	3.568

Carbon Monoxide (CO)				
ppm, dry	2.61	62.2	139	67.9
ppm @ 15% O2	0.91	21.5	50.7	24.4
lb/hr	0.002	0.04	0.09	0.04
lb/day	0.04	0.98	2.17	1.06
gr/bhp-hr	0.019	0.472	1.046	0.512

Carbon Dioxide (CO_2)				
%	13.91	14.79	13.97	14.22
lb/hr	135	152	143	143

Sulfur Dioxide (SO_2)				
ppm, dry	17.8	14.3	27.9	20.0
ppm @ 15% O2	6.18	4.96	10.2	7.11
lb/hr	1.59	1.29	2.51	1.80
lb/day	38.3	30.9	60.2	43.1
gr/bhp-hr	18.466	14.898	29.067	20.810

Volatile Organic Compounds (TNMOC, as Carbon				
ppm, dry	7.34	256	313	192
ppm @ 15% O2	2.56	88.8	114	68.5
lb/hr	0.002	0.07	0.09	0.053
lb/day	0.05	1.70	2.06	1.27
gr/bhp-hr	0.022	0.821	0.993	0.612

Equations:

lb/hr = (1.3711-6 lb-Mole°R / ft3) x 60 min/hr x Qs(std) x MW x ppm / (T(std) + 460)

ppm @ %O2Correction = ppm measured x ((20.9 - O2Correction)/(20.9 - %O2measured))

gr/bhp-hr = (lb/hr x 453.6 g/lb) / Bhp

Constants:

Standard Temp. T(std): 60 °F
Oxygen Correction: 15 %

NO_x, MW = 46.005 lb/lb-mole
CO, MW = 28.010 lb/lb-mole
HC, MW = 16.043 lb/lb-mole
CO_2, MW = 44.01 lb/lb-mole
SO_2, MW = 64.009 lb/lb-mole

Particulate Emissions Calculations

Client: IST Energy | **Standard Temperature: 60**

Source: Diesel Generator

Run #	1	2	3	Average
Date:	12-Sep-12	12-Sep-12	12-Sep-12	
Vm (std) dscf	40.15	42.23	45.78	42.72
Vw (std) scf	6.27	6.23	6.69	6.40
Qs (std) dscfm	139	148	147	145
Bws	0.14	0.13	0.13	0.13
%	3.95	3.86	4.73	4.18
O2	13.91	14.79	13.97	14.22
%	39.16	39.16	39.16	39.16
CO2				
%				
Brake Horsepower hour				

Lab Analysis

Front Half Wash (mg)	6.00	1.40	0.50
Mass Filter (mg)	0.50	0.80	1.90
Back Half Aqueous (mg)	7.90	10.50	12.00
Back Half Organic (mg)	0.50	3.40	3.60
Back Half Total (mg)	8.40	13.90	15.60
Total Catch (mg)	14.90	16.10	18.00

Filterable Particulate

gr/scf	0.0022	0.0007	0.0007	0.0012
gr/dscf	0.0025	0.0008	0.0008	0.0014
gr/dscf @ 12% CO_2	0.0022	0.0007	0.0007	0.0012
lb/hr.	0.00	0.00	0.00	0.00

Condensible Particulate

gr/scf	0.0028	0.0044	0.0046	0.0039
gr/dscf	0.00323	0.00508	0.00526	0.0045
gr/dscf @ 12% CO_2	0.0028	0.0041	0.0045	0.0038
lb/hr.	0.00	0.01	0.01	0.01

Total Particulate

gr/scf	0.0050	0.0051	0.0053	0.0051
gr/dscf	0.00573	0.00588	0.00607	0.0059
gr/dscf @ 12% CO_2	0.0049	0.0048	0.0052	0.0050
lb/hr.	0.0068	0.0075	0.0076	0.0073
g/bhp-hr	0.079	0.086	0.088	0.0847

Calculations

gr/dscf = 0.015432 x ((Mass) / Vmstd)

gr/scf
= 0.015432 x ((Mass) / (Vmstd + Vwstd))

gr/dscf@ 12% CO2 =gr/dscf x (12 / % CO_2)

lb/hr
= 0.00857 x Qs(std) x gr/dscf

gr/bhp-hr = (lb/hr x 453.6 g/lb) / Bhp

SUMMARY OF TNMOC RESULTS
SCAQMD Method 25.3

Client: IST Energy

Source: Diesel Generator

Std. T

	Run 1A 58437	Run 1B 58438	Run 1 Average	Run 2A 58439	Run 2B 58440	Run 2 Average	Run 5844
PARAMETER - UNITS	Vial 1A	Vial 1B	Results	Vial 2A	Vial 2B	Results	Vial
Flowrate - Dscfm			139			148	
Moisture Content - %			0.135			0.129	
Brake Horsepower Hour			39.16			39.16	
Precision criteria %&l20%	18.1	18.1		2.0	2.0		0.4
TNMOC - ppmvw as Carbon *	7.5	5.2	6.4	228	219	224	27
TNMOC - ppmvd as Carbon *			7.3			256	
TNMOC - lb/hr as Carbon			0.002			0.071	
TNMOC - g/bhp-hr as Carbon			0.022			0.821	

EQUATIONS

ppmvw = parts per million on a wet volume basis
MW Carbon = 12.01 lb/lb-mole
MW Hexane = 86.17 lb/lb-mole
Hexane Carbon Number = 6

Conversion Factor = $1.556 * 10^{-7}$ @ 68^{o}F
TNMOC lb/hr as Carbon = TNMOC (EPA Bias Adjusted) * MW Carbon * Conversion Factor * Flowrate
TNMOC lb/hr as Hexane on a MW/C basis = TNMOC (EPA Bias Adjusted) * MW Hexane * Conversion Factor * Flowrate
TNMOC g/bhp-hr as Carbon = lb/hr as Carbon * 453.6 / brake horsepower hour

* TNMOC ppmv data includes EPA Bias Adjustment Factor of 1.086.

FUEL BASED CALCULATIONS

Client: **Date: 12-Sep-12**
IST Energy
Source: Diesel Generator

Run #	Fuel Value (%), Moisture & Ash Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur	GCV Btu/lb, dry	Btu/ft^3	Fuel Oil lb/gal
1	85.37	13.280	0.000	1.350	0.000	19,820	0.0	
2	85.37	13.280	0.000	1.350	0.000	19,820	0.0	
3	85.37	13.280	0.000	1.350	0.000	19,820	0.0	

CALCULATIONS

Run #	Stack Oxygen %	Fuel Gas Flowrate lb/hr	Fuel Gas Flowrate ft3/hr	Fuel Oil Flowrate lb/hr	Fuel Oil Flowrate gal/hr	Solid Fuel lb/hr	Heat Input MMBTU/hr	F-Factor dscf/MMBTU	Qs (std) dscfm
1	3.95							8861	
2	3.86							8861	
3	4.73							8861	

CALCULATIONS

Run #	Fuel Gas Flowrate lb/hr	Fuel Gas Flowrate MCF/day	Fuel Total Sulfur as H_2S ppm	Total Sulfur gr/100 scf	Exhaust Sulfur lb/hr	Exhaust Sulfur lb/day
1		0	11	0.64		
2		0	11	0.64		
3		0	11	0.64		

Heat Input, MMBtu/hr = (lb/hr fuel gas) x Btu/lb / 1E+06
= ((ft^3/hr fuel gas) x (Btu/ft^3 fuel gas)) /1E+06
= (lb/hr fuel oil) x Btu/lb / 1E+06
= (gal./hr fuel oil) x lb/gal. x Btu/lb / 1E+06
= (lb/hr solid fuel) x Btu/lb / 1E+06

F-Factor,dscf/MMBtu = 1E+06 [3.64 scf/lb x (%H)+1.53 scf/lb x (%C) + 0.57 scf/lb x (%S) + 0.14 scf/lb x (%N) - 0.46 scf/lb x (%O_2)] / (Btu/lb) x [(Tstd + 460) / 528]

Qs (std), dscfm = MMBtu/hr x [F-Factor x (20.9/ (20.9-%O_2)) x (1hr / 60min.)]

GCV = Gross Calorific Value of Fuel

grains/100 scf = (1 part S/1000000 part)x(7000 gr/lb)x(32.064 lb/lbmole)x(lbmole/385.3 ft^3)x100

Standard Temperature $60\,^{o}F$

FUEL BASED CALCULATIONS

Client: **Date: 12-Sep-12**
IST Energy
Source: Diesel Generator

Run #	Fuel Value (%), Moisture & Ash: Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur	GCV Btu/lb, dry	Btu/ft^3	Fuel Oil lb/gal
1	13.96	2.220	62.170	21.650	0.000	2,174.6	167.9	
2	13.96	2.220	62.170	21.650	0.000	2,174.6	167.9	
3	13.96	2.220	62.170	21.650	0.000	2,174.6	167.9	

CALCULATIONS

Run #	Stack Oxygen %	Fuel Gas Flowrate lb/hr	Fuel Gas Flowrate ft3/hr	Fuel Oil Flowrate lb/hr	Fuel Oil Flowrate gal/hr	Solid Fuel lb/hr	Heat Input MMBTU/hr	F-Factor dscf/MMBTU	Qs (std) dscfm
1	3.95							12764	
2	3.86							12764	
3	4.73							12764	

CALCULATIONS

Run #	Fuel GasFlowrate lb/hr	Fuel GasFlowrate MCF/day	Fuel Total Sulfur asH_2S ppm	TotalSulfur gr/100 scf	Exhaust Sulfur lb/hr	Exhaust Sulfur lb/day
1			11	0.64		
2			11	0.64		
3			11	0.64		

Heat Input, MMBtu/hr = (lb/hr fuel gas) x Btu/lb / 1E+06
= ((ft^3/hr fuel gas) x (Btu/ft^3fuel gas)) /1E+06
= (lb/hr fuel oil) x Btu/lb / 1E+06
= (gal./hr fuel oil) x lb/gal. x Btu/lb / 1E+06
= (lb/hr solid fuel) x Btu/lb / 1E+06

F-Factor,dscf/MMBtu = 1E+06 [3.64 scf/lb x (%H)+1.53 scf/lb x (%C) + 0.57 scf/lb x (%S) + 0.14 scf/lb x (%N) - 0.46 scf/lb x (%O_2)] / (Btu/lb) x [(Tstd + 460) / 528]

Qs (std), dscfm = MMBtu/hr x [F-Factor x (20.9/ (20.9-%O_2)) x (1hr / 60min.)]

GCV = Gross Calorific Value of Fuel

grains/100 scf = (1 part S/1000000 part)x(7000 gr/lb)x(32.064 lb/lbmole)x(lbmole/385.3 ft^3)x100

Standard Temperature 60 ^{o}F

Run 1 Calculations

Client:	IST Energy	Date:	12-Sep-12
Source:	Diesel Generator	Run #:	1

Field Data

Standard Pressure	29.92	"Hg	Area of the nozzle, An	0.000416 ft^2
P(std)	60	^oF	Pitot Coefficient, Cp	0.99
Standard Temperature, T(std)	114.21	^oF	Stack Diameter	4.00 inches
Meter Temperature, Tm	944.92	^oF		
Stack Temperature, Ts	0.803023			
Sq. Root. dP	1.84			
Meter Orifice, dH		"H_2O	Test Time	60.0 min.
Meter Volume, Vm	47.560 ft^3		Nozzle Diameter	0.2763 inch
Meter Correction, Y	1.0110		Stack Gas O_2	3.95 % O_2
Barometric Pressure, Pbar	27.45 "Hg		Stack Gas CO_2	13.91 % CO_2
Static Pressure, Pstatic	-1.08 "H_2O		Stack Gas CO	0.00 % CO
Condensate - Vlc	135.00 grams		Stack Gas N_2	82.13 % N_2
			Stack Area, As	0.087 ft^2

Calculations

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pbar + (dH / 13.6)) / (Tm + 460)	40.146	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	6.269	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.1351	
Md = (0.44 x %CO_2) + (0.32 x %O_2) + [0.28 x (%N_2+ %CO)]	30.38	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	28.71	lb/lb-mole
P(Stack) = Pbar + [Pstatic / 13.6]	27.37	"Hg
vs = 85.49 x Cp x (Sq.rt.dP) x [Sq.rt.(Ts + 460) / (Ms x P(stack))]	90.88	ft/sec
Qs = vs x As x 60	476	acfm
Qs(std) = Qs x (1-Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	139	dscfm
I = 100 x Ts [0.002669 x Vlc + (Vm x Y / Tm) (Pbar + dH / 13.6)] / (Test time x vs x Pstack x An x 60)	100.72	%

Run 2 Calculations

Client:	IST Energy	Date:	12-Sep-12
Source:	Diesel Generator	Run #:	2

Field Data

Standard Pressure	29.92	"Hg	Area of the nozzle, An	0.000416 ft^2
P(std)	60	^oF	Pitot Coefficient, Cp	0.99
Standard Temperature, T(std)	101.63		Stack Diameter	4.00 inches
Meter Temperature, Tm	923.75	^oF		
Stack Temperature, Ts	0.842722	^oF		
Sq. Root. dP	1.99			
Meter Orifice, dH		"H_2O	Test Time	60.0 min.
Meter Volume, Vm	48.907 ft^3		Nozzle Diameter	0.2763 inch
Meter Correction, Y	1.0110		Stack Gas O_2	3.86 % O_2
Barometric Pressure, Pbar	27.45 "Hg		Stack Gas CO_2	14.79 % CO_2
Static Pressure, Pstatic	-0.94 "H_2O		Stack Gas CO	0.01 % CO
Condensate - Vlc	134.20 grams		Stack Gas N_2	81.35 % N_2
			Stack Area, As	0.087 ft^2

Calculations

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pbar + (dH / 13.6)) / (Tm + 460)	42.225	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	6.232	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.1286	
Md = (0.44 x %CO_2) + (0.32 x %O_2) + [0.28 x (%N_2+ %CO)]	30.52	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	28.91	lb/lb-mole
P(Stack) = Pbar + [Pstatic / 13.6]	27.38	"Hg
vs = 85.49 x Cp x (Sq.rt.dP) x [Sq.rt.(Ts + 460) / (Ms x P(stack))]	94.30	ft/sec
Qs = vs x As x 60	494	acfm
Qs(std) = Qs x (1-Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	148	dscfm
I = 100 x Ts [0.002669 x Vlc + (Vm x Y / Tm) (Pbar + dH / 13.6)] / (Test time x vs x Pstack x An x 60)	99.77	%

Run 3 Calculations

Client:	IST Energy	Date:	12-Sep-12
Source:	Diesel Generator	Run #:	3

Field Data

Standard Pressure	29.92	"Hg	Area of the nozzle, An	0.000449 ft^2
P(std)	60	°F	Pitot Coefficient, Cp	0.99
Standard Temperature, T(std)	96.46		Stack Diameter	4.00 inches
Meter Temperature, Tm	938.83	°F		
Stack Temperature, Ts	0.834789			
Sq. Root. dP	2.23	°F		
Meter Orifice, dH		"H_2O	Test Time	60.0 min.
Meter Volume, Vm	52.124 ft^3		Nozzle Diameter	0.2870 inch
Meter Correction, Y	1.0110		Stack Gas O_2	4.73 % O_2
Barometric Pressure, Pbar	27.65 "Hg		Stack Gas CO_2	13.97 % CO_2
Static Pressure, Pstatic	-1.01 "H_2O		Stack Gas CO	0.01 % CO
Condensate - Vlc	144.00 grams		Stack Gas N_2	81.29 % N_2
			Stack Area, As	0.087 ft^2

Calculations

Vm(std) = [T(std) + 460 / Pstd] x Vm x y x (Pbar + (dH / 13.6)) / (Tm + 460)	45.779	dscf
Vw(std) = (0.04715 ft3/g) / 528 x [T(std) + 460] x Vlc	6.687	scf
Bws = Vw(std) / [Vm(std) + Vw(std)]	0.1274	
Md = (0.44 x %CO_2) + (0.32 x %O_2) + [0.28 x (%N_2+ %CO)]	30.42	lb/lb-mole
Ms = (Md x (1-Bws)) + (18.0 x Bws)	28.84	lb/lb-mole
P(Stack) = Pbar + [Pstatic / 13.6]	27.58	"Hg
vs = 85.49 x Cp x (Sq.rt.dP) x [Sq.rt.(Ts + 460) / (Ms x P(stack))]	93.69	ft/sec
Qs = vs x As x 60	491	acfm
Qs(std) = Qs x (1-Bws) x [(T(std) + 460) / (Ts + 460)] x (P(stack) / Pstd)	147	dscfm
I = 100 x Ts [0.002669 x Vlc + (Vm x Y / Tm) (Pbar + dH / 13.6)] / (Test time x vs x Pstack x An x 60)	101.13	%

TRC

ISOKINETIC FIELD DATA SHEET

Method: **EPA M5**

Project No.		Impinger No.	Contents	Final	Initial	Net	Date	9
Client		1	100 mLs DI H_2O	828.1	734.9	93.2	Operator	
Facility	IST Energy	2	100 mLs DI H_2O	727.7	709.5	18.2	Stack Diameter (in)	
Source	Diesel Generator	3	100 mLs DI H_2O	666.6	660.9	5.7		
Sampling Location	Stack Out	4	Silica Gel	900.4	882.5	17.9		
Condition	Run No. 1				Totals	135.0		

Nozzle ID No.	Nozzle Diameter (in)	Probe Liner Material	Probe Length (ft)	DGM - Meter Box	DGM - Meter Box	DGM - Meter Box	Pitot Tube ID No.	Pitot Tube	Pitot Leak Check Pre-test: Pass?	Pitot Le… Post-tes…
	0.276				1.695	1.011	BK-	0.99	+ ___Y ___N / □___Y ___N	

Traverse Point	Time (24 hr)	DGM Volume (ft^3)	Pitot ΔP (in. H_2O)	Oriface ΔH (in. H_2O)	Temperature (°F) Stack Flue Gas	Probe	Filter Box	Impingers Exit	DGM Meter In	DGM Meter Out	%Isokinetic
1		396.485	0.51	1.44	927				109	105	119.7
2		400.080	0.72	1.90	1025				110	106	114.2
3		404.020	0.76	1.99	1043				112	106	114.5
4		408.060	0.81	2.10	1063				115	108	116.0
5		412.275	0.78	2.05	1045				116	108	115.9
6		416.438	0.77	2.00	1061				118	109	115.7
		420.555									
7		420.555	0.75	2.35	808				120	110	116.1
8		425.030	0.77	2.17	951				123	111	118.7
9		429.440	0.45	1.32	905				125	113	123.5
10		433.028	0.42	1.26	870				125	113	116.8
11		436.350	0.42	1.31	827				125	114	117.8
12		439.758	0.69	2.17	814				125	115	115.2
		444.045								114.2	
Avg		**47.560**	**0.65**	**1.84**	**944.92**				**118.58**	**109.8**	

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWFCO		Volume (ft^3) Start	Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port:	Before					
	After					
Port:	Before					
	After					
Port:	Before					
	After					

Comments:

TRC

ISOKINETIC FIELD DATA SHEET

Method: **EPA M5**

Project No.		Impinger No.	Contents	Final	Initial	Net	Date	9
Client		1	100 mLs DI H_2O	850.5	744.2	106.3	Operator	
Facility	IST Energy	2	100 mLs DI H_2O	667.6	653.9	13.7	Stack Diameter (in)	
Source	Diesel Generator	3	100 mLs DI H_2O	535.6	533.2	2.4		
Sampling Location	Stack Out	4	Silica Gel	918	906.2	11.8		
Condition	Run No. 2				Totals	134.2		

Nozzle ID No.	Nozzle Diameter (in)	Probe Liner Material	Probe Length (ft)	DGM - Meter Box [illegible]		DGM - Meter Box [illegible]	DGM - Meter Box ID No.		Pitot Tube: Pitot Leak Check Pre-test: Pass?		Pitot Le… Post-te…
	0.276				1.695	1.011	BK-	0.99		+ ____Y____N □____Y____N	

Traverse Point	Time (24 hr)	DGM Volume (ft^3)	Pitot ΔP (in. H_2O)	Orifice ΔH (in. H_2O)	Temperature (°F) Stack Flue Gas	Probe	Filter Box	Impingers Exit	DGM Meter In	DGM Meter Out	%Isokinetic	
1		445.738	0.79	2.25	904				103	104	117.9	
2		450.145	0.76	2.15	910				100	101	117.1	
3		454.410	0.75	2.12	910				101	101	115.1	
4		458.575	0.71	2.00	912				101	100	116.0	
5		462.655	0.76	2.14	917				102	99	115.7	
6		466.858	0.72	2.02	918				102	99	114.5	
		470.905										
7		470.905	0.69	1.93	926				103	99	116.1	
8		474.915	0.68	1.91	933				110	102	118.2	
9		478.995	0.69	1.91	938				103	99	113.2	
10		482.888	0.65	1.80	941				104	99	117.5	
11		486.810	0.66	1.83	940				104	99	117.4	
12		490.760	0.67	1.86	936				105	99	114.3	
		494.645								101.63		
Average		48.907	0.71	1.99	923.75				103.17	100.1		

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWFCO		Volume (ft^3) Start	Volume (ft^3) Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port:	Before					
	After					
Port:	Before					
	After					
Port:	Before					
	After					

Comments:

TRC

ISOKINETIC FIELD DATA SHEET

Method: **EPA M5**

				Impinger No.	Contents	Final	Initial	Net		
Project No.									Date	9/
Client				1	100 mLs DI H_2O	809.6	696.2	113.4	Operator	
Facility	IST Energy			2	100 mLs DI H_2O	755.9	742.4	13.5	Stack Diameter (in)	
Source	Diesel Generator			3	100 mLs DI H_2O	605.5	602.8	2.7		
Sampling Location	Stack Out			4	Silica Gel	939.8	925.4	14.4		
Condition		Run No.	3				Totals	144.0		

Nozzle ID No.	Nozzle Diameter (in)	Probe Liner Material	Probe Length (ft)	DGM - Meter Box			DGM - Meter Box ID No.		Pitot Tube		
	0.287				1.695	1.011	BK-	0.99	Pitot Leak Check Pre-test: Pass?	+ ____Y ____N □____Y ____N	Pitot L… Post-te…

Traverse Point	Time (24 hr)	DGM Volume (ft^3)	Pitot ΔP (in. H_2O)	Oriface ΔH (in. H_2O)	Temperature (°F) Stack Flue Gas	Probe	Filter Box	Impingers Exit	DGM Meter In	DGM Meter Out	%Isokinetic
1		495.012	0.75	2.40	931				94	94	118.5
2		499.528	0.78	2.48	939				93	93	115.4
3		503.990	0.74	2.35	941				95	94	119.7
4		508.510	0.72	2.31	939				100	95	118.2
5		512.940	0.77	2.46	938				99	94	114.4
6		517.365	0.78	2.49	940				100	94	119.2
		522.005									
7		522.005	0.65	2.08	939				101	94	120.1
8		526.283	0.62	1.98	941				101	94	118.8
9		530.415	0.69	2.21	941				101	94	119.1
10		534.783	0.65	2.08	942				101	94	118.3
11		538.995	0.63	2.02	938				101	94	117.2
12		543.110	0.60	1.92	937				101	94	117.5
		547.136								96.5	
Average		**52.124**	**0.70**	**2.23**	**938.83**				**98.9**	**94.0**	

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWFCO		Volume (ft^3) Start	Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port:	Before					
	After					
Port:	Before					
	After					
Port:	Before					
	After					

Comments:

Run averages corrected for bias

Operator:
Jeff S. Harris

Plant Name: IST Energy

Location:
Generator Engine

Run	O_2 %	CO_2 %	NOX ppm	CO ppm	SO_2 ppm	CO Hi ppm
1	3.95	13.91	236.01	2.61	17.75	50.6
2	3.86	14.79	328.20	7.24	14.32	62.2
3	4.73	13.97	310.42	7.23	27.94	138.9

Calibration Error Test at Run 1 . STRATA Version 3.2
O2
CO2
NOX
%
%
ppm
9/12/2012
9:46:20
-0.09
0.03
-0.10
9/12/2012
9:47:20
0.10
0.03
0.44
9/12/2012
9:48:20
-0.09
0.04
19.04
9/12/2012
9:49:20
-0.09
0.03
20.94
9/12/2012
9:50:20
-0.10
0.03
20.80
9/12/2012
9:51:20
-0.10
0.03
21.02
9/12/2012
9:52:20
-0.10
0.03
21.20
9/12/2012
9:53:20
-0.10
0.04
21.22
9/12/2012
9:54:20
-0.11
0.04
21.33
9/12/2012
9:55:20
-0.11
0.04
21.33
9/12/2012
9:56:20
-0.11
0.04
21.31
9/12/2012
9:57:20
-0.11
0.03
21.32
9/12/2012
9:58:20
-0.11
0.03

CO	SO2
ppm	ppm
2.4	0.51
3.6	0.21
18.5	0.26
21.2	0.19
21.2	0.01
21.2	-0.20
21.2	-0.18
21.2	-0.11
21.2	0.00
21.2	-0.01
21.2	0.09
21.1	0.60
21.2	1.16
21.2	2.15
21.2	3.39
21.2	0.90
21.2	0.28
21.2	0.12
21.1	0.03
13.9	1.09
3.0	2.00 NO2 ck =
2.7	2.03
2.6	17.80
2.4	2.08
	2.04

Calibration Error Test at Run 1 . STRATA Version 3.2

Date	Time	O2	CO2	NOX	CO	SO2
		%	%	ppm	ppm	ppm
9/12/2012	10:29:52	0.00	0.04	-0.50	3.0	16.48
9/12/2012	10:30:52	0.00	0.03	-0.78	3.0	1.21
9/12/2012	10:31:52	0.00	0.03	-0.82	2.9	0.99
9/12/2012	10:32:52	17.18	14.45	-0.82	2.6	1.39
9/12/2012	10:33:53	21.57	21.26	-0.81	2.3	0.95
9/12/2012	10:34:53	15.90	16.82	-0.54	2.1	2.03
9/12/2012	10:35:53	6.61	7.58	37.89	57.4	2.08
9/12/2012	10:36:53	0.05	0.18	441.31	426.2	0.97
9/12/2012	10:37:53	0.04	0.11	453.65	471.1	63.91
9/12/2012	10:38:53	0.05	0.09	441.33	445.1	83.61
9/12/2012	10:39:53	0.02	0.06	228.96	256.0	33.28
9/12/2012	10:40:53	0.02	0.06	216.83	231.3	43.12
9/12/2012	10:41:53	0.02	0.05	216.55	230.9	44.40
9/12/2012	10:42:53	0.02	0.05	133.86	505.5	26.14
9/12/2012	10:43:53	0.00	0.04	-0.52	907.8	2.61
9/12/2012	10:44:53	0.02	0.02	340.98	628.8	1.44

Calibration Error Test at Run 1

Operator: Jeff S. Harris

Plant Name: IST Energy

Location: Generator Engine

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2	CC014474		CC203664	CC326493
CO2	CC014474		CC203664	CC326493
NOX	CC014474	CC149803	CC345730	SG9136267
CO	CC014474		SX44997	SG9136267
SO2	CC014474		SG9168193	SG9128327

Date/Time	9/12/2012	10:45:01 FAILED			
Analyte	O2	CO2	NOX	CO	SO2
Units	%	%	ppm	ppm	ppm
Zero Ref Cyl	0	0	0	0	0
Zero Avg	0.00	0.03	-0.82	2.7	1.17
Zero Error%	0.0	0.1	0.2	0.3	1.2
Low Ref Cyl					
Low Avg					
Low Error%					
Mid Ref Cyl	10.97	11	217.5	932	45.44
Mid Avg	10.98	10.86	216.55	480.3	43.67
Mid Error%	0.0	0.6	0.2	45.2	1.8
High Ref Cyl	21.57	21.37	454	455.9	87.59
High Avg	21.58	21.32	453.40	920.1	87.70
High Error%	0.0	0.2	0.1	46.4	0.1

Calibration Error Test at Run 1 . STRATA Version 3.2

	CO	CO Hi
	ppm	ppm
9/12/2012 13:18:44	8.17	-11.6
9/12/2012 13:19:44	1.97	-1.0
9/12/2012 13:20:44	0.82	-0.9
9/12/2012 13:21:43	0.58	-1.0
9/12/2012 13:22:44	0.34	-0.9
9/12/2012 13:23:43	0.16	-1.0
9/12/2012 13:24:43	2.99	1.2
9/12/2012 13:25:43	17.50	4.4
9/12/2012 13:26:43	17.55	4.6
9/12/2012 13:27:44	13.65	4.5
9/12/2012 13:28:44	13.37	4.3
9/12/2012 13:29:44	12.91	883.6
9/12/2012 13:30:44	20.00	4960.5
9/12/2012 13:31:44	20.00	4401.1
9/12/2012 13:32:44	20.00	2477.1

Calibration Error Test at Run 1

Operator:
Jeff S. Harris

Plant Name: IST Energy

Location:
Generator Engine

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
CO		CC014474	CC328031	SX47824
CO Hi		CC014474	CC280625	SG901852

Date/Time	9/12/2012	13:33:08 PASSED
Analyte	CO	CO Hi
Units	ppm	ppm
Zero Ref Cyl	0	0
Zero Avg	0.05	-0.8
Zero Error%	0.2	0.0
Low Ref Cyl	11.06	2509
Low Avg	11.29	2474.8
Low Error%	1.1	0.7
Mid Ref Cyl	17.54	4675
Mid Avg	17.52	4680.7
Mid Error%	0.1	0.1
High Ref Cyl		
High Avg		
High Error%		

Test Run 1 Begin. STRATA Version 3.2
Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine
O2
%
9/12/2012 15:24:18
4.00
Begin calculating run averages
9/12/2012 15:25:25
4.00
9/12/2012 15:26:25
3.97
9/12/2012 15:27:25
4.18
9/12/2012 15:28:25
4.25
9/12/2012 15:29:25
4.32
9/12/2012 15:30:25
4.08
9/12/2012 15:31:25
4.05
9/12/2012 15:32:25
3.69
9/12/2012 15:33:25
3.71
9/12/2012 15:34:25
4.37
9/12/2012 15:35:25
4.04
9/12/2012 15:36:25
4.10
9/12/2012 15:37:25
4.04
9/12/2012 15:38:26
3.72
9/12/2012 15:39:26
3.62
9/12/2012 15:40:26
3.93
9/12/2012 15:41:26
4.11
9/12/2012 15:42:26
3.68
9/12/2012 15:43:26
3.63
9/12/2012 15:44:26
3.96
9/12/2012 15:45:26
3.72
9/12/2012 15:46:26
3.56
9/12/2012 15:47:26
3.40
9/12/2012 15:48:26
3.21
9/12/2012 15:49:25
3.10
9/12/2012 15:50:25
2.70
9/12/2012 15:51:25

CO2	NOX	CO	SO2	CO Hi
%	ppm	ppm	ppm	ppm
13.77	243.46	1.45	28.66	-15.1
13.71	245.08	1.49	28.04	-15.1
13.78	239.34	1.48	27.72	-15.5
13.63	244.45	1.48	27.30	-16.6
13.54	240.36	1.52	26.58	-16.6
13.73	262.55	1.59	25.75	-16.7
13.85	273.18	1.67	24.71	-16.7
13.85	270.99	1.69	23.79	-16.8
14.22	278.28	1.69	22.57	-16.7
14.39	283.63	1.64	21.62	-16.8
13.80	303.67	1.74	21.57	-16.7
14.04	296.87	1.90	19.97	-17.3
14.00	270.46	1.94	20.43	-19.8
14.09	303.18	1.89	20.97	-19.8
14.33	302.30	1.80	20.46	-19.7
14.35	301.49	1.70	21.06	-19.7
14.09	310.36	1.56	22.16	-19.8
13.93	326.21	1.58	20.41	-19.7
14.18	326.64	1.61	18.81	-19.7
14.30	303.58	1.55	18.84	-19.5
13.91	286.92	1.48	20.33	-19.8
14.10	279.59	1.49	19.96	-19.8
14.30	278.85	1.52	20.10	-19.8
14.52	282.15	1.55	20.85	-19.8
14.70	279.66	1.56	20.08	-19.7
14.79	275.00	1.54	20.26	-19.6
15.25	276.47	1.52	21.05	-19.7
15.16	274.89	1.55	22.35	-19.6
14.92	270.06	1.62	21.53	-19.8
13.49	246.51	1.86	19.37	-19.6
13.51	242.60	2.10	17.32	-19.8
13.49	242.90	2.11	16.64	-19.8
13.48	244.55	1.84	15.32	-19.7
13.54	247.66	1.64	16.76	-19.8
13.70	251.10	1.59	18.08	-19.9
13.80	254.14	1.55	15.42	-19.9
14.02	257.96	1.49	15.52	-19.8
14.08	254.70	1.40	15.66	-20.7
14.41	253.51	1.30	15.80	-20.9
14.62	249.83	1.22	16.15	-20.8
14.84	243.75	1.17	16.72	-20.8
14.77	238.63	1.16	17.43	-20.7
14.63	252.12	1.28	16.81	-20.9
14.57	264.35	1.45	15.19	-20.9
14.55	283.79	1.57	14.50	-21.0
14.70	300.85	1.51	14.10	-21.0
14.81	298.73	1.38	13.64	-20.9
14.96	279.47	1.27	13.63	-20.9
15.08	263.29	1.19	15.27	-20.9

9/12/2012 16:13:26	4.73	13.37	222.52	1.15	14.60	-22.4
9/12/2012 16:14:26	4.79	13.32	221.90	1.22	15.09	-22.5
9/12/2012 16:15:26	4.74	13.35	215.92	1.23	15.63	-22.3
9/12/2012 16:16:26	4.47	13.58	216.20	1.18	15.93	-22.5
9/12/2012 16:17:26	4.05	14.05	225.85	1.15	15.61	-23.0
9/12/2012 16:18:26	3.98	14.13	230.12	1.18	14.53	-23.0
9/12/2012 16:19:26	3.98	14.13	233.41	1.26	13.94	-23.0
9/12/2012 16:20:26	3.87	14.25	243.42	1.39	13.56	-23.0
9/12/2012 16:21:26	3.72	14.37	251.50	1.50	13.79	-23.0
9/12/2012 16:22:26	3.73	14.33	247.03	1.49	13.82	-23.0
9/12/2012 16:23:26	3.68	14.38	243.35	1.44	13.59	-23.0
9/12/2012 16:24:26	3.63	14.42	249.49	1.38	13.35	-23.0
Average of Test Run	O2	CO2	NOX	CO	SO2	CO Hi
	%	%	ppm	ppm	ppm	ppm
	3.86	14.17	264.29	1.52	18.53	-20.0

9/12/2012 16:24:26
Test Run 1 End

Final System Bias Check for Run 1 . STRATA Version 3.2

O2
CO2
NOX
%
%
ppm
9/12/2012
16:35:04
11.51
8.00
98.82
9/12/2012
16:36:04
10.85
10.81
2.10
9/12/2012
16:37:04
10.86
10.83
-0.24
9/12/2012
16:38:04
10.87
10.83
-0.51
9/12/2012
16:39:04
10.88
10.84
-0.52
9/12/2012
16:40:04
10.89
10.83
-0.59
9/12/2012
16:41:04
10.89
10.84
-0.74
9/12/2012
16:42:04
10.89
10.84
-0.84
9/12/2012
16:43:04
10.90
10.84
-0.84
9/12/2012
16:44:04
10.90
10.83
-0.77
9/12/2012
16:45:03
10.90
10.84
-0.82
9/12/2012
16:46:03
10.95
11.09
-0.76
9/12/2012
16:47:03
11.05
11.08

CO	SO2	CO Hi
ppm	ppm	ppm
20.00	98.83	1394.4
20.00	68.23	51.9
8.14	60.26	28.5
2.85	54.63	13.5
2.44	49.57	4.6
2.08	45.26	-0.8
1.60	41.78	-4.7
1.26	38.96	-8.2
1.04	36.63	-11.3
0.88	34.91	-12.3
0.77	33.30	-13.5
4.65	32.45	-5.5
1.31	29.30	-13.5
0.17	18.63	-10.1
0.18	13.85	-13.2
0.17	11.55	-13.5
0.16	10.10	-13.6
0.14	8.99	-14.1
0.13	8.44	-14.0
0.12	7.85	-14.1
0.11	7.28	-14.1
0.11	6.93	-14.2
0.12	6.79	-13.8
0.13	6.42	-14.0
0.14	5.99	-14.6
0.12	5.68	-15.1
0.11	5.58	-15.1
0.12	5.49	-15.1
0.12	5.32	-15.1
16.01	12.73	38.8
15.76	11.38	-7.1
11.67	11.80	-7.1
17.69	12.37	135.9
20.00	12.72	183.3
20.00	13.15	176.4
18.67	41.96	-14.3
2.71	50.09	-19.6
0.83	53.45	-19.8
5.62	44.70	571.3
20.00	14.45	2386.8

Final System Bias Check for Run 1
Operator:
Jeff D. Harris
Plant Name: IST Energy
Location:
Generator Engine
Reference Cylinder Numbers
Zero
Span
O2
CC14474 CC203664
CO2
CC14474 CC203664
NOX
CC14474 CC345730
CO
CC14474 CC328031
SO2
CC14474 SG9168193

CO Hi CC014474 CC280625

Date/Time	9/12/2012	17:14:36 PASSED			
Analyte	O2	CO2	CO	SO2	CO Hi
Units	%	NOX	ppm	ppm	ppm
Zero Ref Cyl	0	%	0	0	0
Zero Cal	0.00	ppm	0.05	1.17	-0.8
Zero Avg	0.07	0	0.13	5.27	-15.1
Zero Bias%	0.3	0	0.4	4.1	0.3
Zero Drift%	0.0	0.03	-1.8	1.5	-0.3
Span Ref Cyl	10.97	-0.82	11.06	45.44	2509
Span Cal	10.98	0.15	11.29	43.67	2474.8
Span Avg	11.02	-0.83	11.59	46.30	2398.7
Span Bias%	0.2	0.5	1.5	2.6	1.5
Span Drift%	0.6	0	0.6	0.8	-0.1
		0.1			
		-0.1			
		11			
		217.5			

Ini Zero Avg	0.06	10.86	0.11	-0.52	0.48	3.76	-2.4
Ini Span Avg	10.86	216.55	10.68	211.28	11.47	45.45	2405.9
Run Avg	3.86	11.09	14.17	264.29	1.52	18.53	-20.0
Co	0.07	210.34	0.13	-0.68	0.30	4.51	-8.7
Cm	10.94	0.9	10.89	210.81	11.53	45.88	2402.3
Correct Avg	3.83	1.2	14.35	271.49	1.18	15.61	50.6
		1.7					
		-0.2					

Calibration Error Test at Run 2 . STRATA Version 3.2
SO2
ppm
9/12/2012
17:17:48
-0.16
9/12/2012
17:18:48
-0.29
9/12/2012
17:19:49
34.49
9/12/2012
17:20:49
84.13
9/12/2012
17:21:49
63.6

Calibration Error Test at Run 2
Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine
Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
SO2	CC014474		SG9168193	SG9128327

Date/Time	9/12/2012	17:22:34 PASSED
Analyte	SO2	
Units	ppm	
Zero Ref Cyl	0	
Zero Avg	0.47	
Zero Error%	0.5	
Low Ref Cyl		
Low Avg		
Low Error%		
Mid Ref Cyl	45.44	
Mid Avg	44.03	
Mid Error%	1.4	
High Ref Cyl	87.59	
High Avg	88.31	
High Error%	0.7	

Initial System Bias Check for Run 2 . STRATA Version 3.2

SO2
ppm

9/12/2012
17:25:32
-0.18
9/12/2012
17:26:32
9.28
9/12/2012
17:27:32
13.49
9/12/2012
17:28:32
12.96
9/12/2012
17:29:32
12.74
9/12/2012
17:30:32
12.74
9/12/2012
17:31:32
15.56
9/12/2012
17:32:32
16.55
9/12/2012
17:33:32
18.11
9/12/2012
17:34:32
19.41
9/12/2012
17:35:32
18.96
9/12/2012
17:36:32
14.32
9/12/2012
17:37:32
14.70
9/12/2012
17:38:32
13.55
9/12/2012
17:39:32
7.94
9/12/2012
17:40:32
5.61
9/12/2012
17:41:33
20.22
9/12/2012
17:42:33
50.79
9/12/2012
17:43:32
52.07
9/12/2012
17:44:32
52.21
9/12/2012
17:45:33
47.53

Initial System Bias Check for Run 2

Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine
Reference Cylinder Numbers
Zero
Span
SO2
CC014474 SG9168193

Date/Time	9/12/2012	17:45:55 PASSED
Analyte	SO2	
Units	ppm	
Zero Ref Cyl	0	
Zero Cal	0.47	
Zero Avg	4.64	
Zero Bias%	4.2	
Zero Drift%		
Span Ref Cyl	45.44	
Span Cal	44.03	
Span Avg	48.78	
Span Bias%	4.8	
Span Drift%		

Test Run 2 Begin. STRATA Version 3.2
Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine
O2
%
Begin calculating run averages
9/12/2012 17:58:01
4.52
9/12/2012 17:59:02
4.49
9/12/2012 18:00:02
4.40
9/12/2012 18:01:01
4.12
9/12/2012 18:02:01
3.94
9/12/2012 18:03:01
3.99
9/12/2012 18:04:02
4.24
9/12/2012 18:05:02
4.26
9/12/2012 18:06:02
4.37
9/12/2012 18:07:02
4.46
9/12/2012 18:08:02
4.97
9/12/2012 18:09:02
4.68
9/12/2012 18:10:02
4.30
9/12/2012 18:11:02
4.28
9/12/2012 18:12:02
3.95
9/12/2012 18:13:02
3.79
9/12/2012 18:14:02
3.61
9/12/2012 18:15:02
3.55
9/12/2012 18:16:02
3.66
9/12/2012 18:17:02
3.83
9/12/2012 18:18:02
3.50
9/12/2012 18:19:02
3.22
9/12/2012 18:20:02
3.43
Pause
9/12/2012 18:21:02
3.47
9/12/2012 18:22:02
5.15
9/12/2012 18:23:02
0.08
9/12/2012 18:24:02
0.06
9/12/2012 18:25:02
0.06
End Pause
9/12/2012 18:26:02
2.49
9/12/2012 18:27:02
3.42

CO2 %	NOX ppm	CO ppm	SO2 ppm	CO Hi ppm
14.04	332.44	1.31	7.89	-23.0
14.08	330.21	1.46	1.20	-23.0
14.15	332.38	1.52	-1.81	-23.0
14.31	319.46	1.52	-1.99	-23.0
14.46	298.72	1.45	1.97	-23.0
14.51	296.74	1.34	2.21	-23.0
14.40	321.91	1.25	1.99	-23.0
14.45	331.45	1.22	0.28	-23.0
14.38	336.02	1.27	-0.30	-23.0
14.34	343.30	1.35	-0.45	-23.0
13.69	328.85	1.44	-0.65	-23.0
13.73	310.13	1.50	-0.62	-23.0
14.14	271.45	1.46	0.10	-23.0
14.24	279.30	1.34	1.88	-23.0
14.47	284.36	1.19	0.83	-23.0
14.61	275.41	1.10	0.62	-23.0
14.75	271.49	1.03	1.67	-23.0
14.85	266.92	0.98	2.24	-23.0
14.79	271.43	0.96	2.61	-23.0
14.69	277.46	0.97	1.27	-23.0
14.99	288.47	0.99	0.08	-23.0
15.38	296.41	0.97	-0.16	-23.0
15.25	298.81	0.94	-0.25	-23.0
14.67	302.13	6.99	10.29	1944.1
7.52	190.59	20.00	100.77	2639.0
0.32	20.35	20.00	66.80	24.8
0.22	0.40	13.52	42.60	0.7
0.17	0.05	2.48	31.93	-5.3
9.11	126.73	1.78	28.04	-10.2
15.17	307.50	1.66	26.80	-10.9
15.18	308.73	1.54	26.50	-13.5
15.19	314.49	1.45	24.89	-14.9
15.33	313.12	1.39	22.62	-15.1
15.36	313.95	1.32	20.29	-16.2
15.19	329.27	1.26	18.20	-16.7
12.85	274.47 14.736*		55.60 3660.7*	
1.40	69.43		87.76	
0.22	20.00		105.8	
13.40	1.20		48.94	
14.95	19.50		0.0	
	215.99		38.35	
	4.56		-5.2	
14.97	295.40 293.07		30.63 20.06	-12.7
14.87	1.97 1.83		-9.7 23.78	-14.3
14.55	305.39		22.37	-16.3
14.59	1.66		23.97	51.7
	312.32			
	1.47			
	315.29 11.573*			

9/12/2012 18:42:02	3.96	14.71	315.84	19.996*	32.14	55.2
9/12/2012 18:43:02	3.69	14.91	316.57	19.997*	49.62	164.2
9/12/2012 18:44:02	3.36	15.21	316.93	19.997*	66.82	292.3
9/12/2012 18:45:02	3.42	15.20	317.99	19.997*	74.85	393.3
9/12/2012 18:46:01	3.67	15.09	320.84	19.996*	34.71	223.7
9/12/2012 18:47:02	3.71	14.98	324.41	19.996*	22.04	79.7
9/12/2012 18:48:02	3.43	15.20	327.00	19.997*	35.14	168.6
9/12/2012 18:49:02	3.10	15.46	329.31	19.997*	45.99	-5.1
9/12/2012 18:50:01	2.93	15.64	329.15	19.997*	91.69	116.3
9/12/2012 18:51:02	3.46	15.25	335.87	19.996*	69.66	108.0
9/12/2012 18:52:02	3.60	15.02	345.04	16.686*	28.47	-2.9
9/12/2012 18:53:02	3.42	15.13	345.81	16.892*	24.60	-10.8
9/12/2012 18:54:02	3.21	15.31	347.08	7.14	33.85	-14.6
9/12/2012 18:55:01	3.49	15.14	346.48	11.690*	46.10	80.3
9/12/2012 18:56:02	3.70	14.90	343.03	19.997*	33.62	8.9
9/12/2012 18:57:01	3.58	15.00	343.88	17.703*	23.09	-7.4
9/12/2012 18:58:02	3.78	14.91	344.38	15.852*	27.27	0.3
9/12/2012 18:59:02	3.80	14.84	339.54	19.592*	21.17	10.7
9/12/2012 19:00:01	3.80	14.90	340.26	19.997*	23.91	41.9
9/12/2012 19:01:02	4.35	14.51	337.48	19.522*	19.28	-9.1
9/12/2012 19:02:02	4.83	13.99	331.77	12.79	11.30	-15.2
9/12/2012 19:03:02	4.78	13.93	325.54	6.21	10.16	-22.4
9/12/2012 19:04:02	4.72	13.99	323.00	4.74	9.86	-23.0
9/12/2012 19:05:02	4.64	14.05	319.70	3.59	9.81	-23.0
9/12/2012 19:06:02	4.67	14.00	315.72	3.19	9.93	-23.8
9/12/2012 19:07:02	4.60	14.07	311.65	3.52	10.45	-23.9
Average of Test Run	O2	CO2	NOX	CO	SO2	CO Hi
	%	%	ppm	ppm	ppm	ppm
	3.91	14.71	316.65	7.583*	18.48	40.3

9/12/2012 19:07:39
Test Run 2 End

Final System Bias Check for Run 2 . STRATA Version 3.2

		O2	CO2	NOX
		%	%	ppm
9/12/2012	19:08:40	8.25	11.41	186.27
9/12/2012	19:09:40	10.86	10.88	0.44
9/12/2012	19:10:41	10.87	10.88	-0.30
9/12/2012	19:11:41	10.88	10.87	-0.51
9/12/2012	19:12:41	4.33	5.82	2.49
9/12/2012	19:13:41	0.09	0.28	9.47
9/12/2012	19:14:41	[illegible]	0.20	2.46
9/12/2012	19:15:41	0.08	0.15	31.14
9/12/2012	19:16:41	0.07	0.13	198.32
9/12/2012	19:17:41	0.09	0.11	209.00
9/12/2012	19:18:41	0.06	0.10	46.67
9/12/2012	19:19:41	0.06	0.09	-0.23
9/12/2012	19:20:40	0.06	0.08	

CO	SO2	CO Hi
ppm	ppm	ppm
3.71	10.61	-23.6
2.80	6.10	-24.0
1.49	5.62	-23.9
0.36	5.21	-23.9
3.10	4.99	-23.3
11.01	4.45	-23.0
11.40	4.03	-23.0
15.68	4.23	80.0
20.00	3.79	176.8
20.00	5.48	114.7
14.02	42.18	-24.2
1.21	46.76	-24.6
0.78	47.31	-24.6
17.90	23.43	2080.0

Final System Bias Check for Run 2

Operator:
Jeff S. Harris

Plant Name: IST Energy

Location:
Generator Engine

Reference Cylinder Numbers

	Zero	Span
O2	CC014474	CC203664
CO2	CC014474	CC203664
NOX	CC014474	CC345730
CO	CC014474	CC328031
SO2	CC014474	SG9168193
CO Hi	CC014474	CC280625

Date/Time 9/12/2012 19:21:43 PASSED

Analyte	O2	CO2	NOX	CO	SO2	CO Hi
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0	0	0	0	0	0
Zero Cal	0.00	0.03	-0.82	0.05	0.47	-0.8
Zero Avg	0.10	0.16	-0.52	0.22	5.04	-23.9
Zero Bias%	0.4	0.5	0.1	0.9	4.6	0.5
Zero Drift%	0.1	0.0	0.1	0.5	0.4	-0.2
Span Ref Cyl	10.97	11	217.5	11.06	45.44	2509
Span Cal	10.98	10.86	216.55	11.29	44.03	2474.8
Span Avg	10.88	10.87	208.89	11.39	47.44	2386
Span Bias%	0.4	0.0	1.5	0.5	3.4	1.8
Span Drift%	-0.6	-0.9	-0.3	-1.0	-1.3	-0.3

Ini Zero Avg	0.07	0.15	-0.83	0.13	4.64	-15.1
Ini Span Avg	11.02	11.09	210.34	11.59	48.78	2398.7
Run Avg	3.91	14.71	316.65	7.58	18.48	40.3
Co	0.08	0.15	-0.68	0.17	4.84	-19.5
Cm	10.95	10.98	209.62	11.49	48.11	2392.3
Correct Avg	3.86	14.79	328.20	7.24	14.32	62.2

Test Run 3 Begin. STRATA Version 3.2
Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine
O2
%
9/12/2012 19:22:44
2.66
9/12/2012 19:23:44
4.20
Begin calculating run averages
9/12/2012 19:25:03
4.13
9/12/2012 19:26:03
4.17
9/12/2012 19:27:03
4.27
9/12/2012 19:28:03
4.30
9/12/2012 19:29:03
4.75
9/12/2012 19:30:03
9.87
9/12/2012 19:31:03
5.27
9/12/2012 19:32:03
5.01
9/12/2012 19:33:03
4.86
9/12/2012 19:34:02
4.88
9/12/2012 19:35:02
4.86
9/12/2012 19:36:02
5.05
9/12/2012 19:37:03
5.15
9/12/2012 19:38:02
5.19
9/12/2012 19:39:03
5.13
9/12/2012 19:40:02
5.14
9/12/2012 19:41:03
5.06
9/12/2012 19:42:03
5.14
9/12/2012 19:43:03
5.35
9/12/2012 19:44:03
5.44
9/12/2012 19:45:03
5.40
9/12/2012 19:46:03
5.37
9/12/2012 19:47:03
5.35
9/12/2012 19:48:03
5.28
9/12/2012 19:49:03
5.26
9/12/2012 19:50:03
5.18
9/12/2012 19:51:03
5.05
9/12/2012 19:52:03
5.02
9/12/2012 19:53:03
5.21

CO2	NOX	CO	SO2	CO Hi
%	ppm	ppm	ppm	ppm
7.14	79.15	20.00	6.27	746.7
14.10	313.90	18.72	8.15	-9.6
14.25	316.92	9.16	9.57	-13.7
14.28	319.68	9.32	13.36	-15.1
14.18	320.62	9.88	11.27	-15.1
14.15	321.53	10.60	9.29	-15.1
13.19	316.28	15.464*	36.67	3083.9
7.92	224.11	19.997*	98.31	901.7
13.14	288.97	19.795*	50.75	5.1
13.40	303.24	6.58	27.86	-4.3
13.59	308.82	5.77	19.05	-6.5
13.58	313.48	6.60	23.10	-9.2
13.63	314.81	7.76	17.87	-10.5
13.48	315.73	8.97	20.68	-12.5
13.43	316.21	6.29	18.12	-19.7
13.50	317.89	1.99	16.57	-22.1
13.65	317.59	1.82	15.47	-23.0
13.64	312.92	1.85	16.25	-23.2
13.76	307.12	1.86	13.02	-24.0
13.83	306.79	1.84	12.71	-23.8
13.67	303.98	1.79	13.60	-24.2
13.45	301.82	1.79	13.73	-24.2
13.51	299.81	1.80	13.08	-24.7
13.49	294.09	1.79	13.19	-24.7
13.48	293.51	1.71	14.31	-24.8
13.53	294.70	1.59	14.29	-24.8
13.58	296.88	1.55	14.13	-24.8
13.62	297.82	1.78	13.56	-24.8
13.74	296.85	2.48	15.43	-24.6
13.80	295.93	4.17	15.39	-24.8
13.62	292.72	6.50	14.17	-24.7
13.79	290.09	8.30	13.68	-24.8
13.87	294.62	8.69	15.63	-24.9
13.96	294.36	9.14	16.94	-24.0
14.10	295.27	10.51	18.99	-22.4
14.05	293.05	13.85	18.96	-18.4
13.94	289.66	19.67	17.64	-15.1
14.05	289.54	19.27	19.60	-15.1
14.06	289.04	19.721*	20.69	-14.1
14.07	288.79	19.997*	20.83	-13.5
14.10	288.33	19.997*	23.08	-13.5
14.09	286.59	19.997*	20.81	-13.5
14.05	284.20	19.996*	18.26	-13.5
13.87	282.75	19.997*	15.52	-9.0
13.18	267.34	19.996*	28.43	2503.3
9.98	105.71 19.995*			
10.05	100.42*			
	6143.8*			
	83.06			
	20.00			
	100.42			
	6143.8			

9/12/2012 20:10:03	2.35	10.04	93.02	20.00	100.41	6143.8
9/12/2012 20:11:02	7.14	12.05	47.15	20.00	100.41	5370.0
9/12/2012 20:12:03	5.28	11.44	223.69	20.00	100.41	326.9
9/12/2012 20:13:02	0.46	4.45	177.86	20.00	100.41	194.3
9/12/2012 20:14:02	0.07	0.29	1.63	14.39	100.41	70.7
9/12/2012 20:15:03	1.76	5.20	29.12	7.97	100.41	42.9
9/12/2012 20:16:03	3.44	14.62	262.31	8.55	100.41	24.1
9/12/2012 20:17:03	0.15	1.62	96.65	8.20	99.03	6.1
9/12/2012 20:18:03	3.81	11.44	128.87	6.87	95.54	-1.2
9/12/2012 20:19:03	3.97	14.40	275.07	5.49	86.02	-7.0
End Pause						
9/12/2012 20:20:03						
9/12/2012 20:21:03						
9/12/2012 20:22:03	3.80	14.61	275.49		33.86	-11.7
9/12/2012 20:23:03	3.75	14.69	4.54		28.39	-13.7
9/12/2012 20:24:03	3.78	14.66	281.97		63.06	-15.8
9/12/2012 20:25:03	3.84	14.63	4.35		72.86	-19.0
9/12/2012 20:26:03	3.96	14.52	286.28		74.19	-20.9
9/12/2012 20:27:03	4.02	14.45	4.16		73.56	-21.8
9/12/2012 20:28:03	4.08	14.37	288.83		71.51	-22.7
9/12/2012 20:29:02	4.08	14.37	3.95		69.15	-23.2
9/12/2012 20:30:03	4.13	14.33	289.19		67.06	-24.0
9/12/2012 20:31:02	4.16	14.30	3.68		64.86	-24.4
9/12/2012 20:32:03	4.14	14.28	291.64		62.74	-24.6
9/12/2012 20:33:03	4.20	14.25	3.38		60.84	-24.6
9/12/2012 20:34:03	4.34	14.16	295.32		58.19	-24.7
9/12/2012 20:35:03	4.41	14.10	3.14		55.17	-24.8
9/12/2012 20:36:03	4.52	14.04	295.62		52.98	-24.7
Average of Test Run	4.58	13.95	2.94		51.08	-24.6
	4.47	14.06	296.98		49.47	-24.7
	O2	CO2	2.78		SO2	CO Hi
	%	%	299.21		ppm	ppm
	4.75	13.80	2.66		31.24	108.7
			303.49			
			2.58			
9/12/2012 20:36:18			306.40			
Test Run 3 End			2.50			
			310.11			
			2.41			
			312.05			
			2.36			
			312.51			
			2.37			
			306.63			
			2.42			
			303.09			
			2.45			
			NOX			
			CO			
			ppm			
			ppm			
			298.16 7.579*			

Final System Bias Check for Run 3 . STRATA Version 3.2

Date	Time	O2 (%)	CO2 (%)	NOX (ppm)
9/12/2012	20:38:09	7.74	12.53	242.90
9/12/2012	20:39:09	10.89	10.93	21.43
9/12/2012	20:40:09	10.90	10.92	0.55
9/12/2012	20:41:09	10.91	10.90	0.15
9/12/2012	20:42:09	10.91	10.90	-0.23
9/12/2012	20:43:09	10.92	10.90	-0.27
9/12/2012	20:44:09	10.92	10.90	-0.53
9/12/2012	20:45:09	10.93	10.89	-0.53
9/12/2012	20:46:10	10.93	10.89	-0.52
9/12/2012	20:47:10	10.93	10.91	-0.53
9/12/2012	20:48:10	10.92	10.92	-0.53
9/12/2012	20:49:10	10.94	10.92	-0.52
9/12/2012	20:50:10	10.94	10.92	

CO (ppm)	SO2 (ppm)	CO Hi (ppm)
2.50	45.74	-26.1
2.25	43.12	-26.2
1.57	41.51	-26.2
0.82	40.06	-26.2
0.54	39.06	-26.2
0.51	38.02	-26.2
0.49	37.05	-26.2
0.47	36.01	-26.2
0.45	34.99	-26.2
0.44	34.49	-26.2
0.41	32.16	-26.2
0.39	24.12	-26.2
0.38	16.91	-26.2
0.38	11.25	-26.2
0.38	7.19	-26.2
0.43	4.80	-25.7
6.60	4.32	-24.6
7.04	4.45	-24.6
8.78	2.24	-24.6
10.16	0.99	-24.6
11.34	5.77	-24.6
11.49	9.86	-24.2
19.41	12.69	164.8
20.00	14.32	174.7
19.03	36.09	-16.8
2.93	57.58	-28.9
0.91	48.32	-29.4
9.75	36.85	1045.6
20.00	5.09	2391.2

Final System Bias Check for Run 3

Operator:
Jeff S. Harris
Plant Name: IST Energy
Location:
Generator Engine

Reference Cylinder Numbers

	Zero	Span
O2	CC314474	CC203664
CO2	CC314474	CC203664
NOX	CC314474	CC345730
CO	CC314474	CC328031
SO2	CC314474	SG9168193
CO Hi	CC314474	CC280625

Date/Time 9/12/2012 21:06:35 PASSED

Analyte	O2	CO2	NOX	CO	SO2	CO Hi
Units	%	%	ppm	ppm	ppm	ppm
Zero Ref Cyl	0	0	0	0	0	0
Zero Cal	0.00	0.03	-0.82	0.05	0.47	-0.8
Zero Avg	0.08	0.10	-0.52	0.37	5.01	-26.2
Zero Bias%	0.3	0.3	0.1	1.6	4.5	0.5
Zero Drift%	-0.1	-0.2	0.0	0.7	0.0	0.0
Span Ref Cyl	10.97	11	217.5	11.06	45.44	2509

Span Cal	10.98	10.86	216.55	11.29	44.03	2474.8
Span Avg	10.94	10.92	208.63	11.50	47.87	2397.1
Span Bias%	0.1	0.2	1.6	1.0	3.8	1.6
Span Drift%	0.3	0.2	-0.1	0.5	0.4	0.2

Ini Zero Avg	0.10	0.16	-0.52	0.22	5.04	-23.9
Ini Span Avg	10.88	10.87	208.89	11.39	47.44	2386.0
Run Avg	4.75	13.80	298.16	7.58	31.24	108.7
Co	0.09	0.13	-0.52	0.29	5.03	-25.0
Cm	10.91	10.89	208.76	11.44	47.65	2391.5
Correct Avg	4.73	13.97	310.42	7.23	27.94	138.9

TRC

40 CFR 60 Method 1 -- TRAVERSE POINT LOCATIONS

Project No.	Date 9-11-12
Client 1st Energy	Operator K.L.
Facility Edwards Airforce Base	Source ONE Diesel Generator

Dimensions

Circular		Rectangular	
Far Wall to Outside of Port (in.)	4"	Stack Width (in.)	NA
Port Length (in.)	0"	Depth (in.)	
Stack Diameter or Depth (in.)	4"	Equiv. Stack Diameter (in.)	

Point No.	A Internal Dimension (in.)	B Percentage of Internal Dimension (%)	(A x B) Distance from Inside Wall (in.)	C Port Length (in.)	(A x B) + C Point Location (in.)
1	4"	.021	.1"	0"	.1"
2		.067	.3"		.3"
3		.118	.5"		.5"
4		.177	.7"		.7"
5		.250	1.00"		1.00"
6		.356	1.40"		1.40"

Stack / Ports Stack Type: ✓ Circular ___ Rectangular

Number and Type of Ports Available: 2, 1

Port Inside Diameter (in.): 1", 2.5"

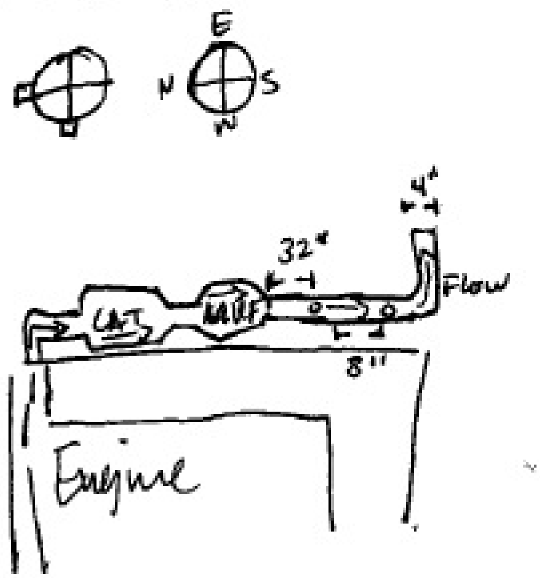
Distance to Flow Disturb. Reference: ___ Disturbance ✓ Port

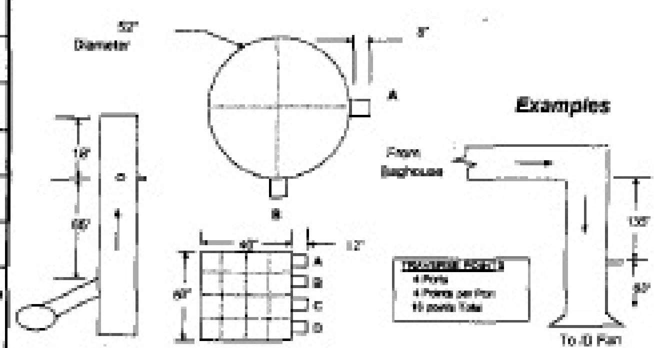
	Distance (ft)	Diameters
Upstream (U)	32	8
Downstream (D)	8	2

Number of Traverse Points	CEM	Particulates	Velocity
Minimum Required	16	12	12
Number of Ports Used	2	2	2
Points per Port	8	6	6

Test Location Schematic(s)

1. Include distances to disturbances and note what they are.
2. Show and label all ports. Note which was used for each test type.
3. Indicate the air flow direction.





Comments: Need a portable set up. Standard pito, and Quartz liner.

NA = Not Applicable
Rev. 1a (10/2008)

Checked By: [signature] 10.12.12 (Project Manager or QA Manager - sign and date)

TRC

ISOKINETIC FIELD DATA SHEET

Method: ARB 5 — 1 of 1

Project No	
Client	IST ENERGY
Facility	EAFB LANDFILL
Source	Diesel Generator
Sampling Location	GENERATOR STACK
Condition	35 KW
Run No.	1

Nozzle ID No.	Diameter (in.)	Probe Liner Material	Length (ft)	Pitot Tube ID No.	PTCF (C_p)
BKQ-4	0.2763	Glass	2'		0.99

Meter Box No.	DGM - Meter Box ΔH@	DGMCF or γ
BK-02	1.695	1.011

Impinger Contents (grams) 734.9

Impinger	Contents	Final	Initial	Net
1	100 ml 5% DI H_2O	928.1	~~660.9~~ 834.9	93.2
2	100 ml 5% DI H_2O	727.7	709.5	18.2
3	MT	666.6	660.9	5.7
4				
5				
Silica Gel		900.4	882.5	17.9
Impinger Box Number:	6		Total:	135
Recovery Date:	9.13.12	Recovered by:	JSH	

Date	9.12.12		
Operator	XG - JSH		
Stack Diameter (in)	4"	K Factor	6.9035
Barometric Pressure (in. Hg)	27.45	Filter No.	423
Assumed Moisture (%)	0.1%	Ambient Temp. (°F)	95°
Static Pressure (in. H_2O)	-1.08	Probe Setting (°F)	250

Pitot Tube Leak Checks

Pitot Leak Check Pre-test: Pass?	Pitot Leak Check Post-test: Pass?
+ ✓ Y ___ N	+ ✓ Y ___ N
- ✓ Y ___ N	- ✓ Y ___ N

Traverse Point	Time (24 hr)	DGM Volume (ft³)	Pitot ΔP (in. H_2O)	Orifice ΔH (in. H_2O)	Stack Flue Gas (°F)	Probe (°F)	Filter Box (°F)	Impingers Exit (°F)	DGM Meter In (°F)	DGM Meter Out (°F)	VΔP		Pump Vacuum (in. Hg)
A- 1	1522	396.485	0.51	1.44	927	249	250	67	109	105	0.7141		4
2	5	400.080	0.72	1.90	1025	253	252	66	110	106	0.8485		5
3	10	404.020	0.76	1.99	1043	255	252	67	112	106	0.8718		5.5
4	15	408.060	0.81	2.10	1063	253	250	66	115	108	0.9000		6
5	20	412.275	0.78	2.05	1045	253	251	64	116	108	0.8832		6
6	25	416.438	0.77	2.00	1061	254	250	63	118	109	0.8775		6
1552	30	420.555	0.75	—	—	—	—	—	—	—	—	—	—
B- 1	1553	420.555	0.75	2.35	908	262	248	65	120	110	0.8660		6.5
2	35	425.030	0.77	2.17	857	274	252	64	123	111	0.8775		6.5
3	40	429.440	0.45	1.32	905	263	250	63	125	113	0.6708		4
4	45	433.028	0.42	1.26	870	258	250	63	125	113	0.6481		4
5	50	436.350	0.44	1.31	827	248	250	64	125	114	0.6481		4
6	55	439.758	0.69	2.17	814	250	249	64	125	115	0.8307		6
	60	444.045	—	—	—	—	—	—	—	—	—		—
			10.2034		944.92 °F				1186	109.8			
	60	47.560	0.66	1.8376	~~860.H~~ °R					114.7	0.8030		

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWFCO		Volume (ft³) Start	Volume (ft³) Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port A	Before	396.146	396.147	60	15	0.001
	After	/	/	/	/	/
Port B	Before	/	/	/	/	/
	After	444.088	444.089	60	9	0.001

Comments: (Test Location Schematic may be drawn here, unless a separate sheet is used.)

10 WWL = .26

O_2 = 3.5

CO_2 = 14.5

NA = Not Applicable
Rev. 1c (10-1-2008)

Checked By: Jeff J. Harris 10.12.12 (Project Manager or QA Manager - sign and date)

ISOKINETIC FIELD DATA SHEET

Method: ARB 5

1 of 1

Project No.	
Client	IST Energy
Facility	EAFB Landfill
Source	Diesel Generator
Sampling Location	Generation Stack
Condition	35 KW
Run No.	2

Nozzle ID No.	Nozzle Diameter (in.)	Probe Liner Material	Probe Length (ft)	Pitot Tube ID No.	PTCF / C_p
BK04	0.2763	Glass	2'		.99

Meter Box No.	DGM - Meter Box ΔH@	DGMCF or Y
BK-02	1.695	1.021

Impinger	Contents	Final	Initial	Net
1	100 ml DI H_2O	850.5	744.2	106.3
2	100 ml DI H_2O	667.6	653.9	13.7
3	MT	535.6	533.2	2.4
4				
5				
Silica Gel		918	906.2	11.8
Impinger Box Number:		3	Total:	134.2
Recovery Date: 9.12.12		Recovered by:	JSH	

Date	9-12-12
Operator	XG - JSH
Stack Diameter (in)	4"
Barometric Pressure (in. Hg)	27.45
Assumed Moisture (%)	10%
Static Pressure (in. H_2O)	-0.94
K Factor	6.9061
Filter No.	424
Ambient Temp. (°F)	95°
Probe Setting (°F)	250°

Pitot Tube Leak Checks

	Pitot Leak Check Pre-test: Pass?	Pitot Leak Check Post-test: Pass?
+	✓ Y ___ N	✓ Y ___ N
−	✓ Y ___ N	✓ Y ___ N

Traverse Point	Time (24 hr)	DGM Volume (ft^3)	Pitot ΔP (in. H_2O)	Orifice ΔH (in. H_2O)	Stack Flue Gas (°F)	Probe (°F)	Filter Box (°F)	Impinger Exit (°F)	DGM Meter In (°F)	DGM Meter Out (°F)	VdP	Pump Vacuum (in. Hg)
A-1	1712	445.738	0.79	2.25	904	247	250	67	103	104	.8888	6
2	5	450.145	0.76	2.15	910	266	241	57	100	101	.8718	6
3	10	454.410	0.75	2.12	910	268	255	58	101	101	.8660	6
4	15	458.575	0.71	2.00	912	256	255	60	101	100	.8426	6
5	20	462.655	0.76	2.14	917	250	257	60	102	99	.8718	6.5
6	25	466.858	0.72	2.02	918	254	252	67	102	99	.8485	6
1742	30	470.905		—								
B-1	1743	470.905	0.69 (lkt)	1.93	926	250	249	66	103	99	.8307	6.0
2	35	474.915	0.68	1.91	933	247	247	64	110	102	.8246	6.0
3	40	478.995	0.69	1.91	938	252	253	62	103	99	.8307	6.0
4	45	482.888	0.65	1.80	941	252	250	61	104	99	.8062	6.0
5	50	486.810	0.66	1.83	940	250	250	59	104	99	.8124	6.0
6	55	490.760	0.67	1.86	936	250	257	61	105	99	.8185	6.0
1813	60	494.645	—	—	—	—	—	—	—	—	—	—
		48.907	0.71	1.99	923.8				103.2	100.1 / 101.6	.8422	

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWFCO		Volume (ft^3) Start	Volume (ft^3) Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port	Before	445.724	445.724	60	15	0.004
	After	/	/	/	/	/
Port	Before	/	/	/	/	/
	After	494.64	494.65	60	5	0.005

Comments: (Test Location Schematic may be drawn here, unless a separate sheet is used.)

O2 = 3.5

CO2 = 14.5

NA = Not Applicable
Rev. 1c (10-1-2008)

Checked By: Jeff S. Harris 10.12.12 (Project Manager or QA Manager - Initial)

ISOKINETIC FIELD DATA SHEET

Method: A2BS

1 of 1

Project No.		Date	9-12-12
Client	IST Energy	Operator	K.L./J.H.
Facility	EAFB Land Fill	Stack Diameter (in)	4"
Source		Barometric Pressure (in. Hg)	27.65
Sampling Location		Assumed Moisture (%)	10%
Condition	35 kW	Static Pressure (in. H2O)	-1.01
Run No.	3	K Factor	8.0383
		Filter No.	425
		Ambient Temp. (°F)	92°
		Probe Setting (°F)	250°

Nozzle ID No.	Nozzle Diameter (in.)	Probe Liner Material	Probe Length (ft)	Pitot Tube ID No.	PTCF / C_p
NG-7	.2770	Glass	2'		.99

DGM - Meter Box: Meter Box No.	ΔH@	DGMCF or Y
BK-02	1.695	1.011

Impinger Contents (grams)

Impinger	Contents	Final	Initial	Net
1	100 mLs DI H2O	809.6	696.2	113.4
2	100 mLs DI H2O	755.9	742.4	13.5
3	MT	605.6	602.8	2.7
4				
5				
Silica Gel		939.8	925.4	14.4
Impinger Box Number: 7			Total:	144

Recovery Date: 9.13.12 Recovered by: JH

Pitot Tube Leak Checks

Pitot Leak Check Pre-test: Pass?	Pitot Leak Check Post-test: Pass?
+ ✓ Y ___ N	+ ✓ Y ___ N
- ✓ Y ___ N	- ✓ Y ___ N

Traverse Point	Time (24 hr)	DGM Volume (ft³)	Pitot ΔP (in. H2O)	Orifice ΔH (in. H2O)	Stack Flue Gas (°F)	Probe (°F)	Filter Box (°F)	Impingers Exit (°F)	DGM Meter In (°F)	DGM Meter Out (°F)	√ΔP		Pump Vacuum (in. Hg)
A-1	1854	495.012	0.75	2.40	931	238	246	57	94	94	.8660		4
2	5	499.528	[illegible]	2.48	939	254	256	57	93	93	.8832		4
3	10	503.990	0.74	2.35	941	270	258	56	95	94	.8602		4
4	15	508.510	0.72	2.31	939	264	256	58	100	95	.8485		4
5	20	512.940	0.77	2.46	938	259	253	61	99	94	.8775		4
6	25	517.365	0.78	2.49	940	260	250	62	100	94	.8832		4
1924	30	522.605	—	—	—	—	—	—	—	—	—		
B-1	1925	522.005	0.65	2.08	939	259	253	[illegible]	102	94	.8062		4
2	35	526.283	0.62	1.98	941	254	253	63	107	94	.7874		4
3	40	530.415	0.69	2.21	941	249	250	63	101	94	.8307		4.5
4	45	534.783	0.65	2.08	942	250	250	64	101	94	.8062		4
5	50	538.995	0.63	2.02	938	249	250	64	101	94	.7937		4
6	55	543.110	0.60	1.92	937	249	250	64	101	94	.7746		4
1955	60	547.186	—	—	—	—	—	—	—	—	—		
									98.9	94			
	60	52.124	.70	2.23	938.8					96.5	.8348		

Sample Train Leak Checks (e.g., pre-test, at each port change, post-test)

Port / AWPOD		Volume (ft³) Start	Volume (ft³) Stop	Time (sec.)	Vacuum (in Hg)	Leak Rate (cfm)
Port:	Before	499.46	499.56	60	13	0.011
	After					
Port:	Before					
	After	547.160	547.163	60	10	0.003

Comments: (Test Location Schematic may be drawn here, unless a separate sheet is used.)

n = 35

Wc = 145

NA = Not Applicable
Rev. 1c (10-1-2006)

Checked By: J. Hauer 10.12.12 (Project Manager or QA Manager - sign and date)

TRC

SCAQMD METHOD 25.3
FIELD DATA SHEET

Company: IST ENERGY

Test Location: EAFB LANDFILL - ~~GENERATO~~ GENERATOR ENGINE

Operator: JSH

Date: 9.12.12

Canister 1 of Run 1		Canister 1 dup of Run 1		Canister 2 of Run 2		Canister 2 dup of Run 2		Canister 3 of Run 3		Canister 3 dup of Run 3	
Canister # 000067		Canister # 000093		Canister # 000112		Canister # 000158		Canister # 000210		Canister # 000014	
Vial A of Run 1		Vial B of Run 1		Vial C of Run 2		Vial D of Run 2		Vial E of Run 3		Vial F of Run 3	
Vial # A		Vial # B		Vial # C		Vial # D		Vial # E		Vial # F	
Sample ID No.:		Sample ID No.:		Sample ID No.:		Sample ID No.:		Sample ID No.:		Sample ID No.:	
Time Clock/Sample	Vacuum (in.Hg)	Time Clock/Sample	Vacuum (in.Hg)	Time Clock/Sample	Vacuum (in.Hg)	Time Clock/Sample	Vacuum (in.Hg)	Time Clock/Sample	Vacuum (in.Hg)	Time Clock/Sample	Vacuum (in.Hg)
1521 /0	28	1521 /0	28	1712/0	28	1712/0	28	1850 /0	28	1850 /0	28
1531/10	22	1531/10	23	1722/10	23	1722/10	22	1900/10	23	1900/10	23
1541/20	19	1541/20	20	1732/20	18	1732/20	17	1910/20	19	19 /20	19
1551/30	15	1551/30	16	1742/30	13	1742/30	14	1920/30	13	/30	14
1601/40	12	1601/40	13	1752/40	09	1752/40	09	1930/40	08	/40	08
1611/50	08	1611/50	09	1802/50	07	1802/50	06	1940/50	05	/50	05
1618/60	05	1618/60	05	1808/60	05	1808/60	05	/60		/60	

1

2

3

Reference Method QA/QC

Client: IST Energy **Date:** 12-Sep-12
Source: Diesel Generator

NOX CONVERTOR CHECK

NOX RANGE: 25

	RESPONSE	% EFFICIENCY
NO_XPPM (C_2ppm)	17.80	97.57
NO PPM (C_1ppm)	0.13	
ZERO	-0.08	

	CAL GAS
NO_2Conc (C_0ppm)	18.24
CYLINDER NUMBER	CC149803

$D_1 = [\ C_0 - C_1]$ $D_1 =$ 18.11

$D_2 = [\ C_2 - C_1]$ $D_2 =$ 17.67

$D_3 = [\ C_0 - C_2]$ $D_3 =$ 0.44

%*CE* must be larger than 90%

D_3 must be lees than 1.0 ppm

TRC METHOD 5 PRE-TEST CONSOLE CALIBRATION

USING WET-TEST METER: 16505065

5-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	2010
Console Serial Number	BK-02
DGM Model Number	S-275
DGM Serial Number	462183

Calibration Conditions			
Date	Time	27-Oct-11	0833
Barometric Pressure		29.6	in Hg
Calibration Technician		JSH	
Calibration Meter Gamma		0.9980	unitless

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data

Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})	(Vw_i)	(Vw_f)	(t_{wi})	(t_{wf})
min	in H_2O	cubic feet	cubic feet	°F	°F	cubic feet	cubic feet	°F	°F
16.00	0.5	810.394	817.098	70	73	632.900	639.613	66	66
16.00	1.0	817.890	827.198	72	75	640.400	649.696	66	66
16.00	1.5	827.799	838.975	74	76	650.300	661.459	66	65
16.00	2.0	839.616	852.504	75	76	662.100	674.965	65	65
16.00	3.0	853.427	869.241	75	80	675.900	691.692	63	64

Results

Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate	ΔH @	
				Value	Variation	Std & Corr	0.75 SCFM	Variation
$(V_{m(std)})$	$(Q_{m(std)})$	$(Vw_{(std)})$	$(Qw_{(std)})$	(Y)	(ΔY)	$(Q_{m(std)(corr)})$	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
6.597	0.412	6.653	0.416	1.009	-0.002	0.416	1.604	-0.091
9.136	0.571	9.213	0.576	1.008	-0.002	0.576	1.671	-0.024
10.952	0.685	11.070	0.692	1.011	0.000	0.692	1.735	0.040
12.634	0.790	12.775	0.798	1.011	0.000	0.798	1.740	0.045
15.483	0.968	15.726	0.983	1.016	0.006	0.983	1.724	0.030
				1.011	Y Average		1.695	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02

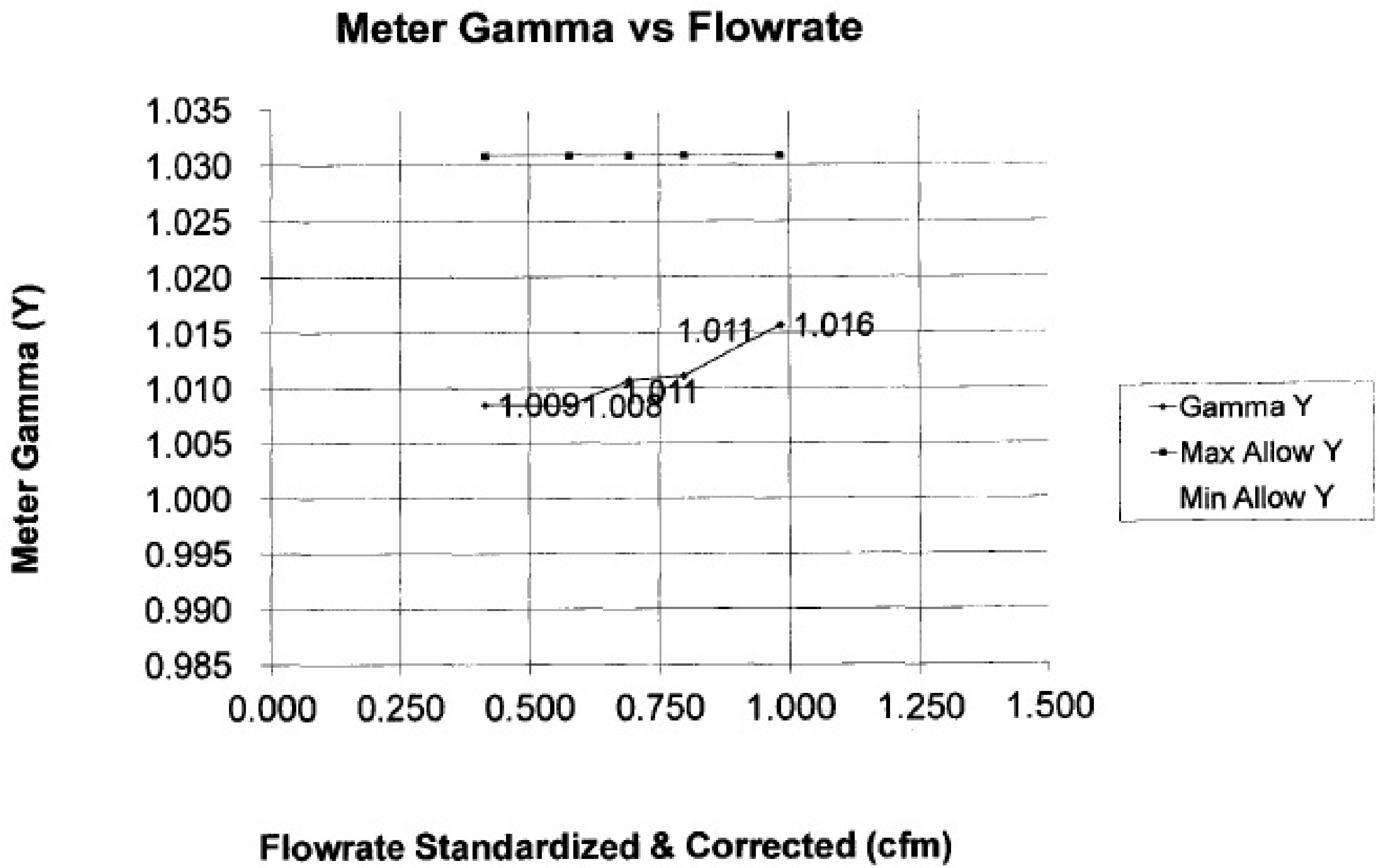
Note: For $\Delta H_@$, orifice pressure differential that equates to 0.75cfm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is +-0.2inches (5.1mm)H

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature [signature] Date 10-27-11

Calibration Date: 10-27-2011

Calibration Technician: JSH

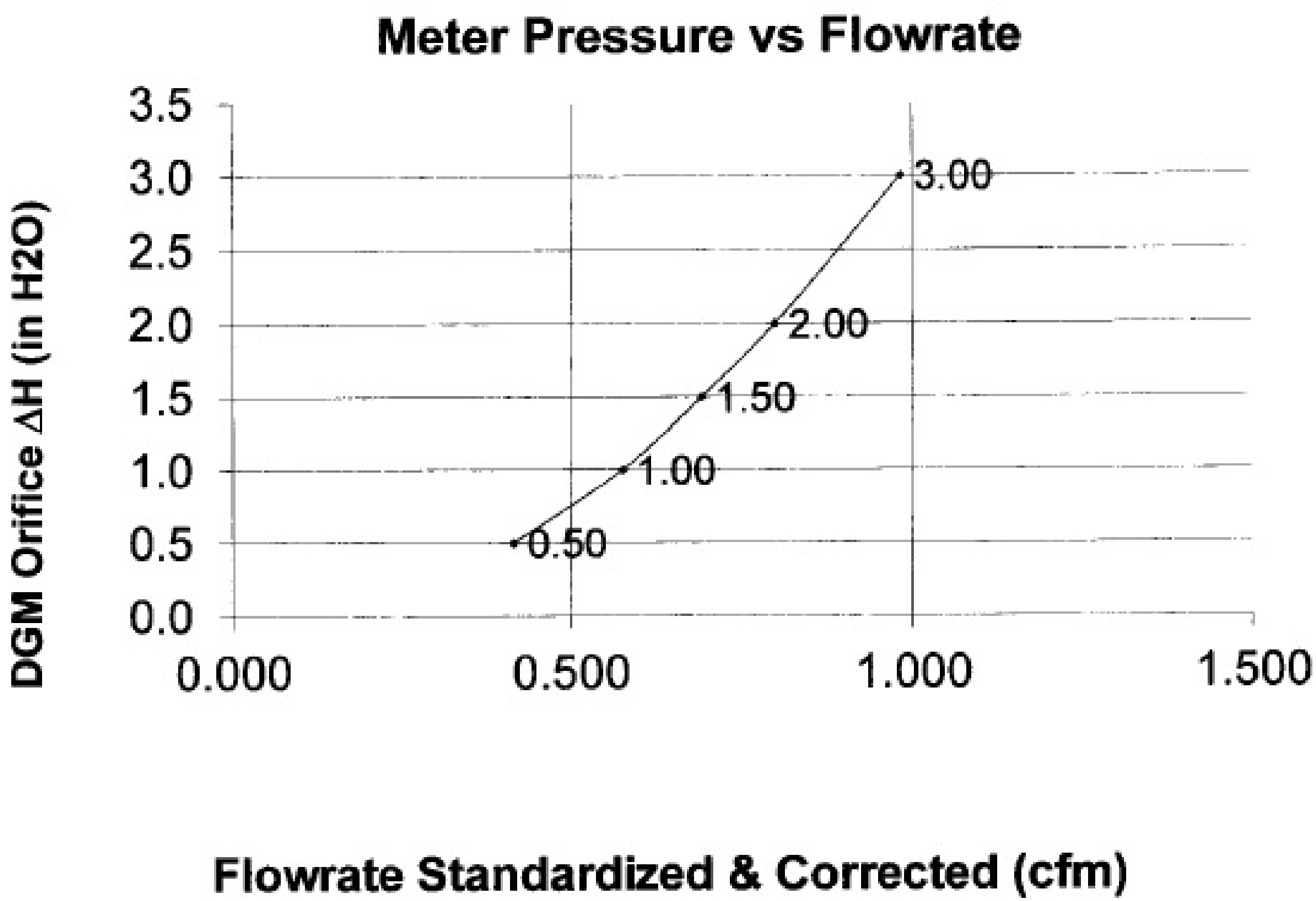


Console Serial: BK-02

Console Model: 2010

Calibration Date: 10-27-2011

Calibration Technician: JSH



Console Model: 2010

Console Serial: BK-02

TRC METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	2010
Console Serial Number	BK-02
DGM Initial Factor Y	1.011
DGM Serial Number	462163

Calibration Conditions			
Date	Time	1-Oct-12	14:30
Barometric Pressure		29.2	in Hg
Theoretical Critical Vacuum[1]		13.8	in Hg
Calibration Technician		DJN	
Orifices Series		JP	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	oR/in Hg
Company	1st Energy	
Method	Carb Method 5	

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 \cdot R^{1/2})/(in.Hg \cdot min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{ambi})	(t_{ambf})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
15.0	2.05	635.025	646.918	81	81	63	0.5819	80	81	16
15.0	2.05	646.918	658.624	81	83	63	0.5819	81	81	16
15.0	2.05	658.624	670.748	83	84	63	0.5819	81	80	16

Results

Standardized Data				Dry Gas Meter				
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	ΔH @	
				Value	Variation	Std & Corr	0.75 SCFM	Variation
(V_{mstd})	(Q_{mstd})	(Vcr_{std})	(Q_{crstd})	(Y)	(ΔY)	$(Q_{mstdcorr})$	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
11.375	0.758	10.952	0.730	0.963	-0.001	0.730	2.081	0.004
11.366	0.758	10.947	0.730	0.963	0.000	0.730	2.079	0.002
11.362	0.757	10.952	0.730	0.965	0.001	0.730	2.072	-0.006
		Difference %	4.694	0.964	Y Average		2.077	DH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

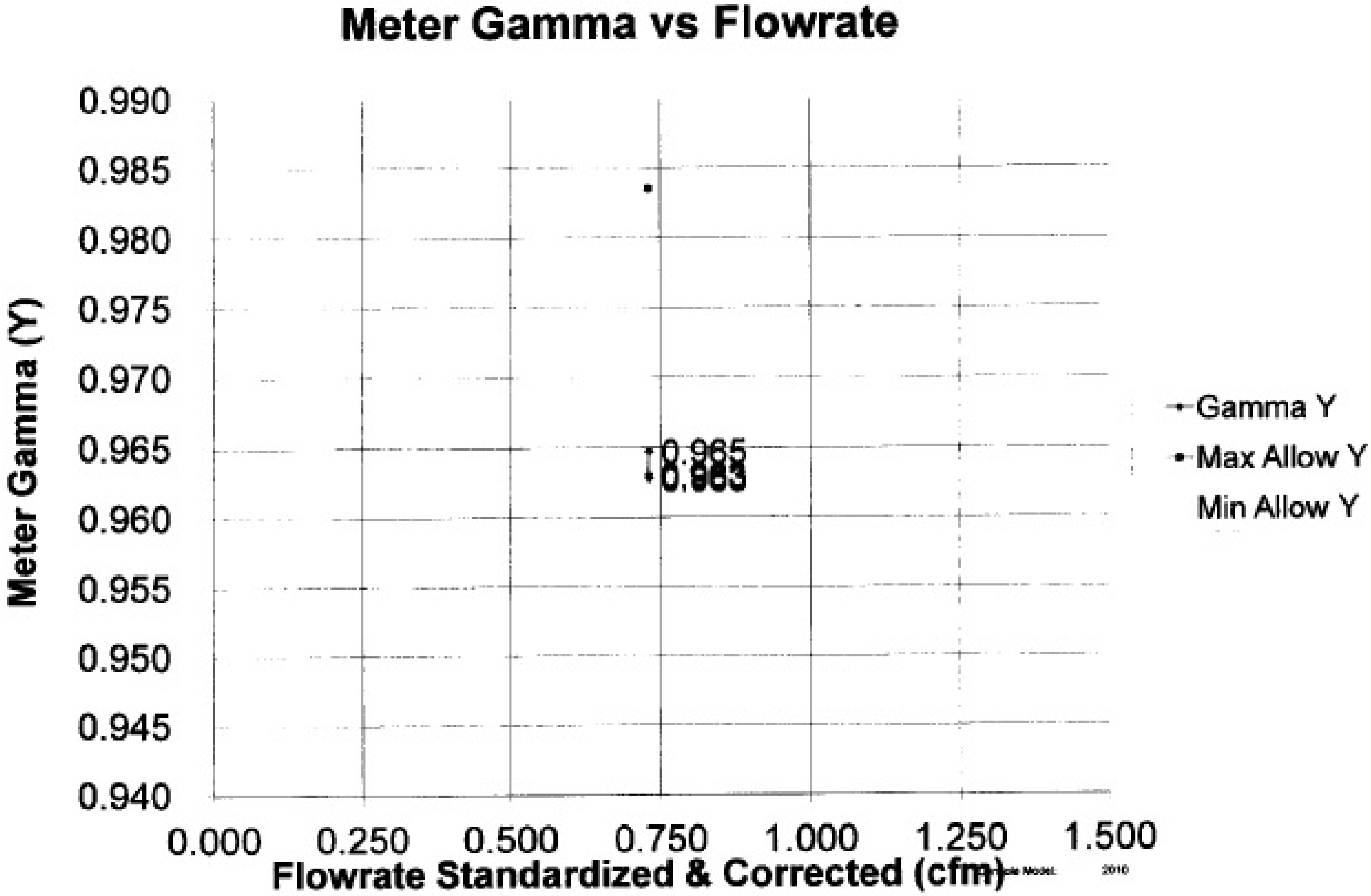
I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature ____________ Date 10-1-12

10-1-12 Post Test M-5, 1st Energy, DH @ 2.05, JP Series calibration-orifices REV 3 5-4-10

Calibration Date: 10-1-2012

Calibration Technician: DJN



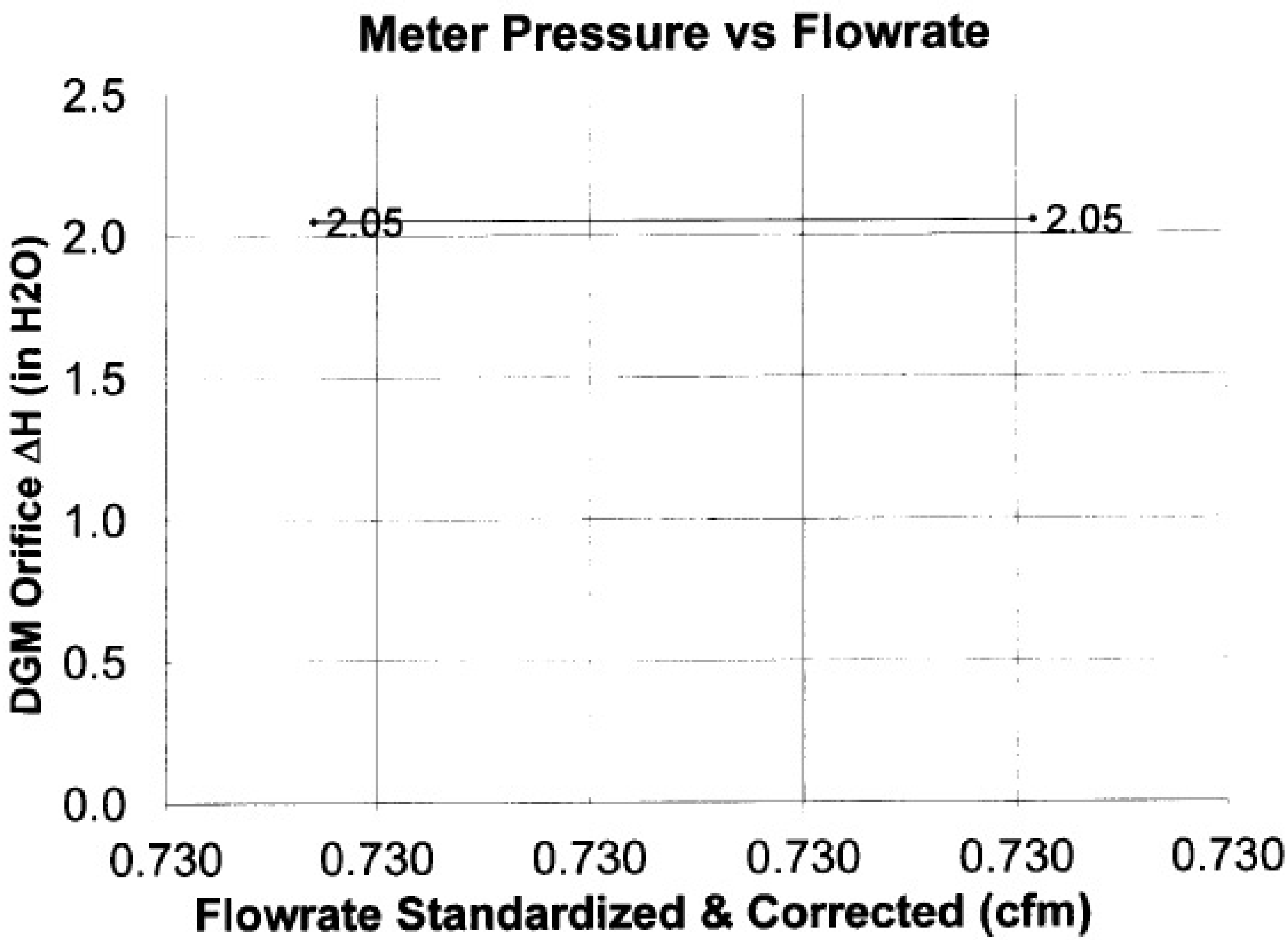
Console Model: 2010

Console Serial: BK-02

Calibration Date: 10-1-2012

Calibration Technician: DJN

10-1-12 Post Test M-5, 1st Energy, DH @ 2.0[illegible], JP Series calibration-orifices REV 3 5-4-10



Console Serial: BK-02

Console Model: 2010

TRC

TEMPERATURE DISPLAY CALIBRATION

Meter Console Number: BK-02

Reference Calibrator

Make: Extech   Model: Oyster   Serial No: 852211

Operator: JSH   Date: 10/27/2011

Pretest: X   Posttest:

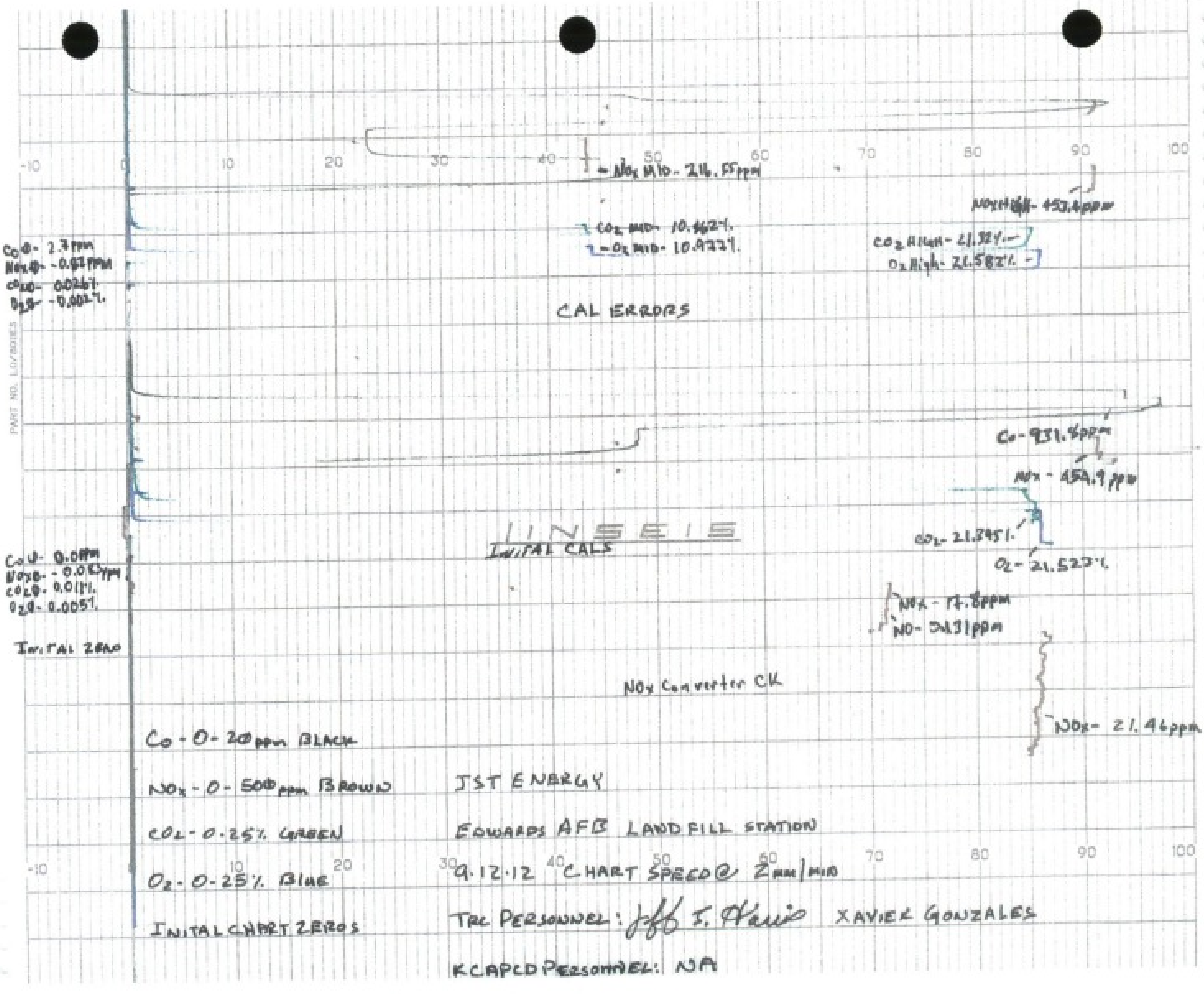
Reference Point #	Reference Temperature	Temperature Reading °F	Criteria	Criteria Met
1	32	31	0.20	YES
2	90	90	0.00	YES
3	200	200	0.00	YES
4	300	300	0.00	YES
5	400	401	-0.12	YES
6	500	501	-0.10	YES
7	600	601	-0.09	YES
8	700	701	-0.09	YES
9	800	800	0.00	YES
10	900	900	0.00	YES
11	1000	1000	0.00	YES
12	1200	1199	0.06	YES
13	1400	1398	0.11	YES
14	1600	1598	0.10	YES
15	1800	1796	0.18	YES
16	1950	1951	-0.04	YES

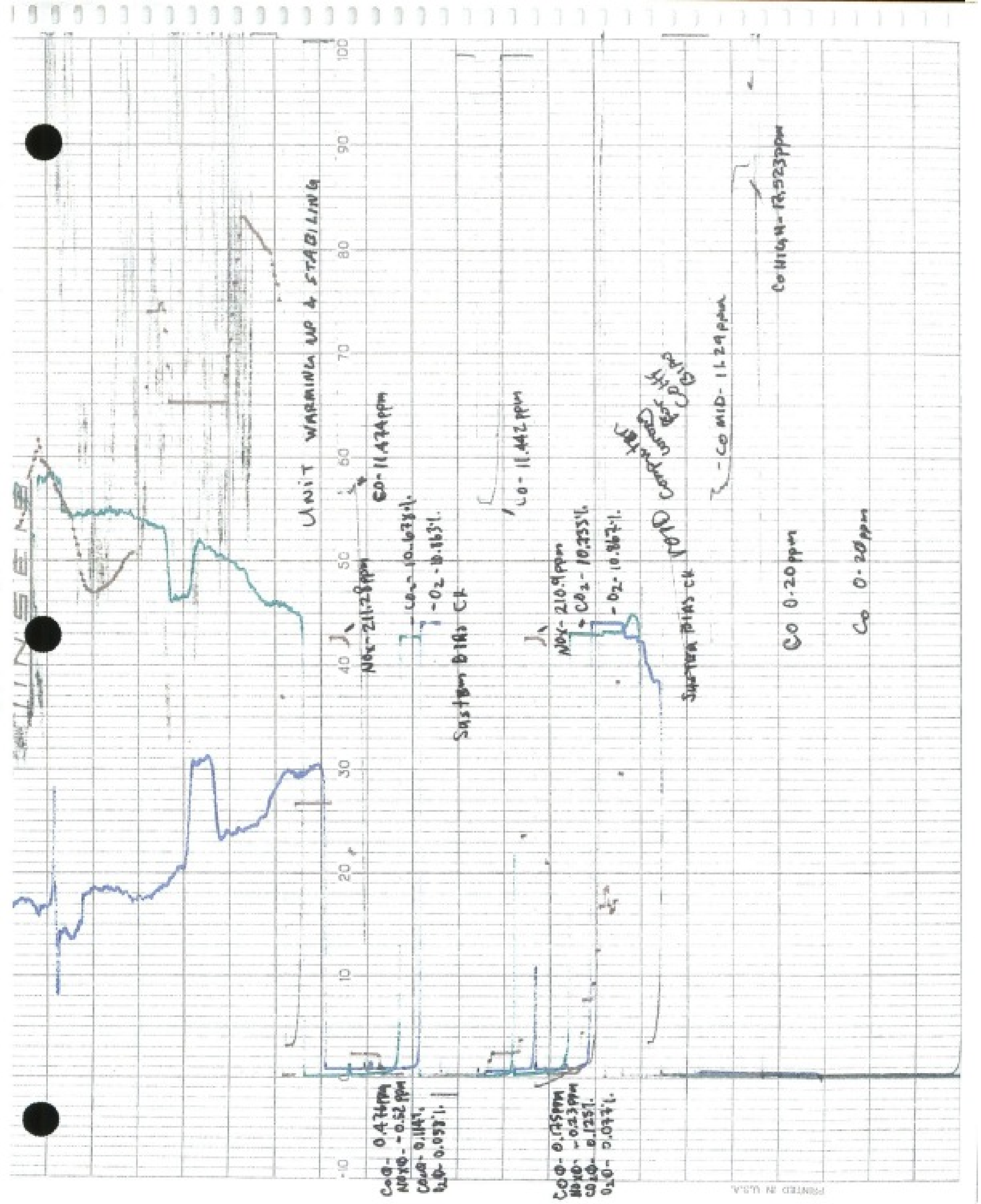
Criteria: Percent difference between the Reference Temperature and the Average Temperature can be only ± 1.5% °R

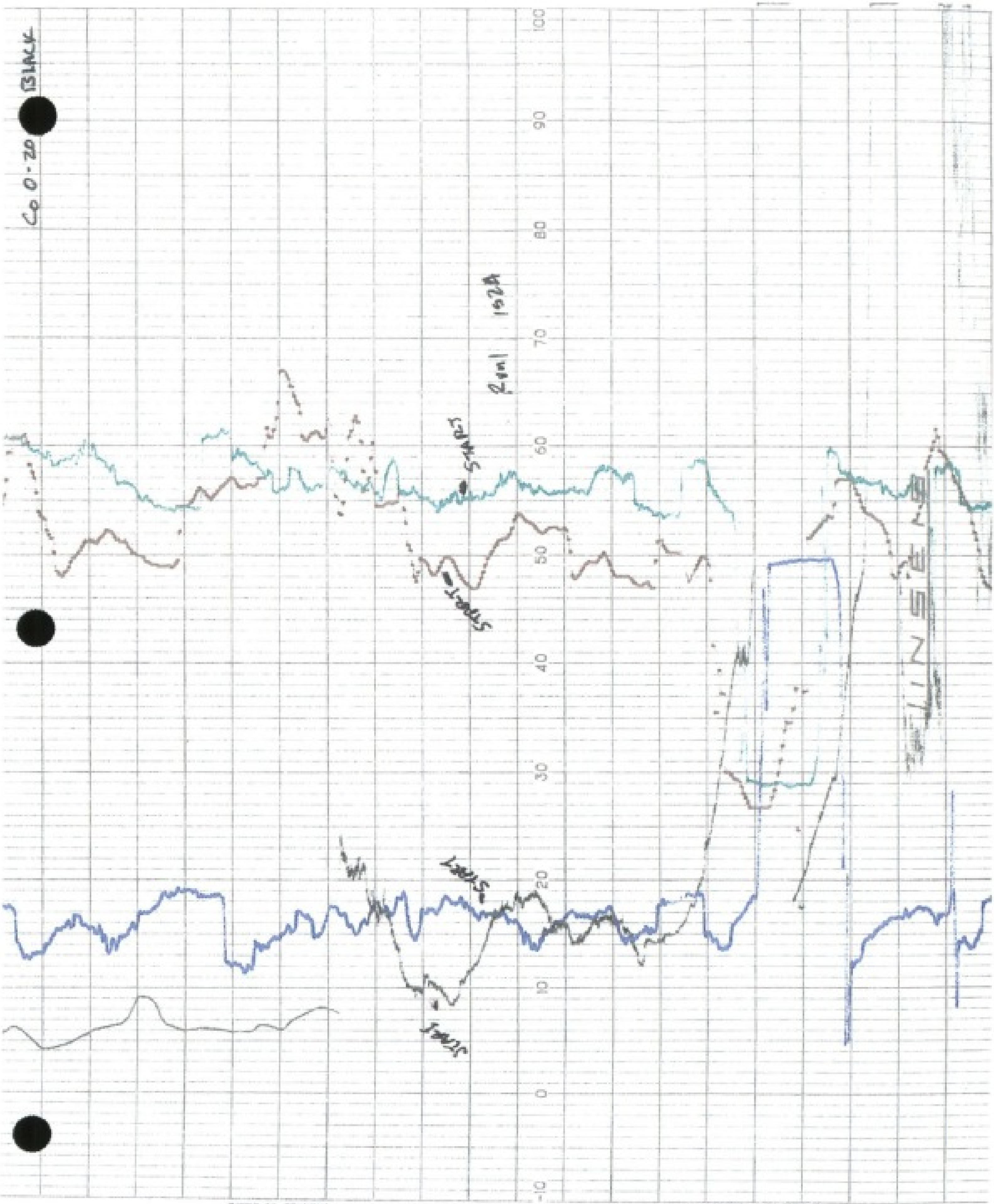
Equation: $\frac{[(\text{Ref. Temp.} + 460) - (\text{Temp. Reading} + 460)] \times 100}{(\text{Ref. Temp.} + 460)}$

QA/QC Check By: [signature]

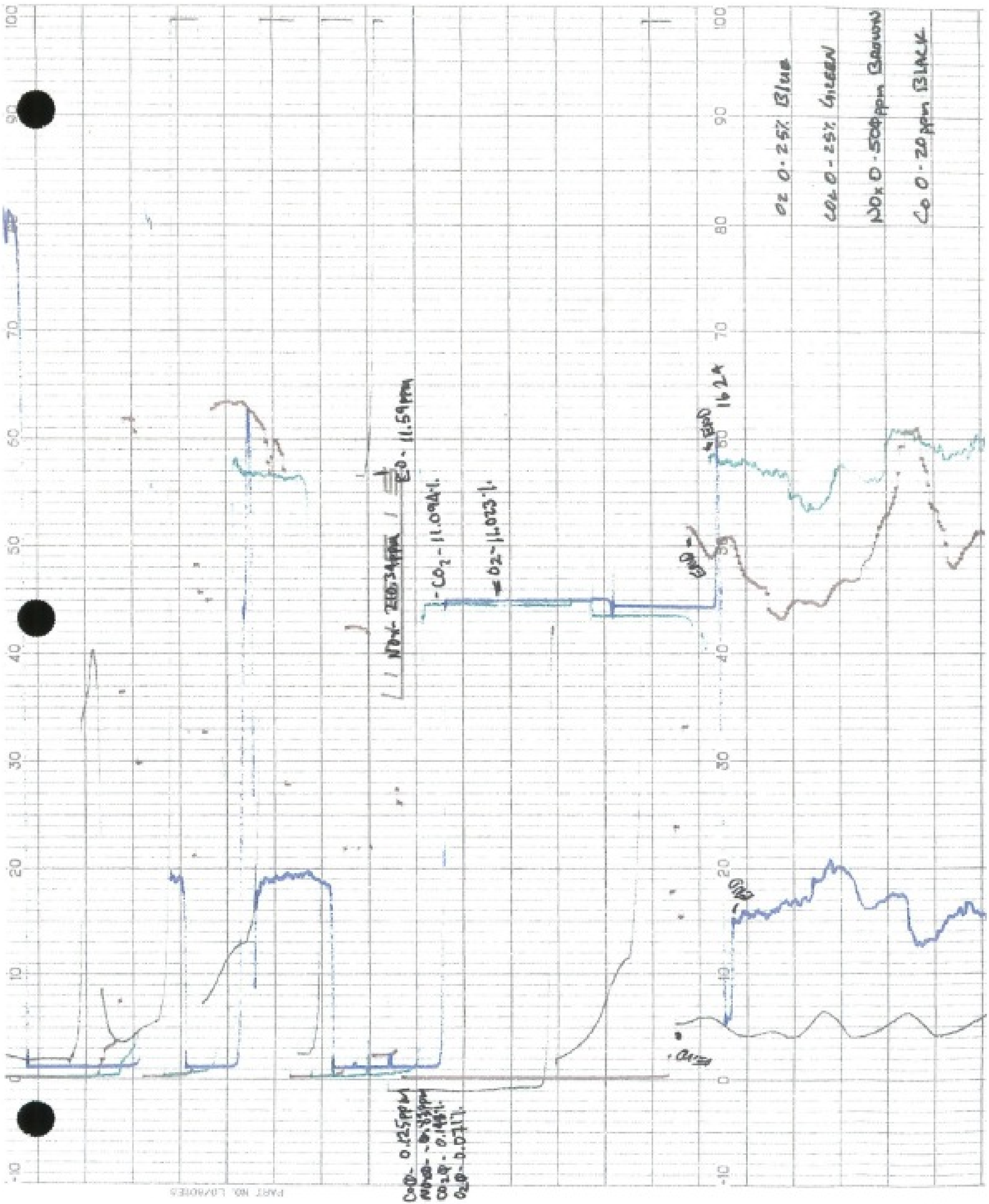
Date: 11/14/11

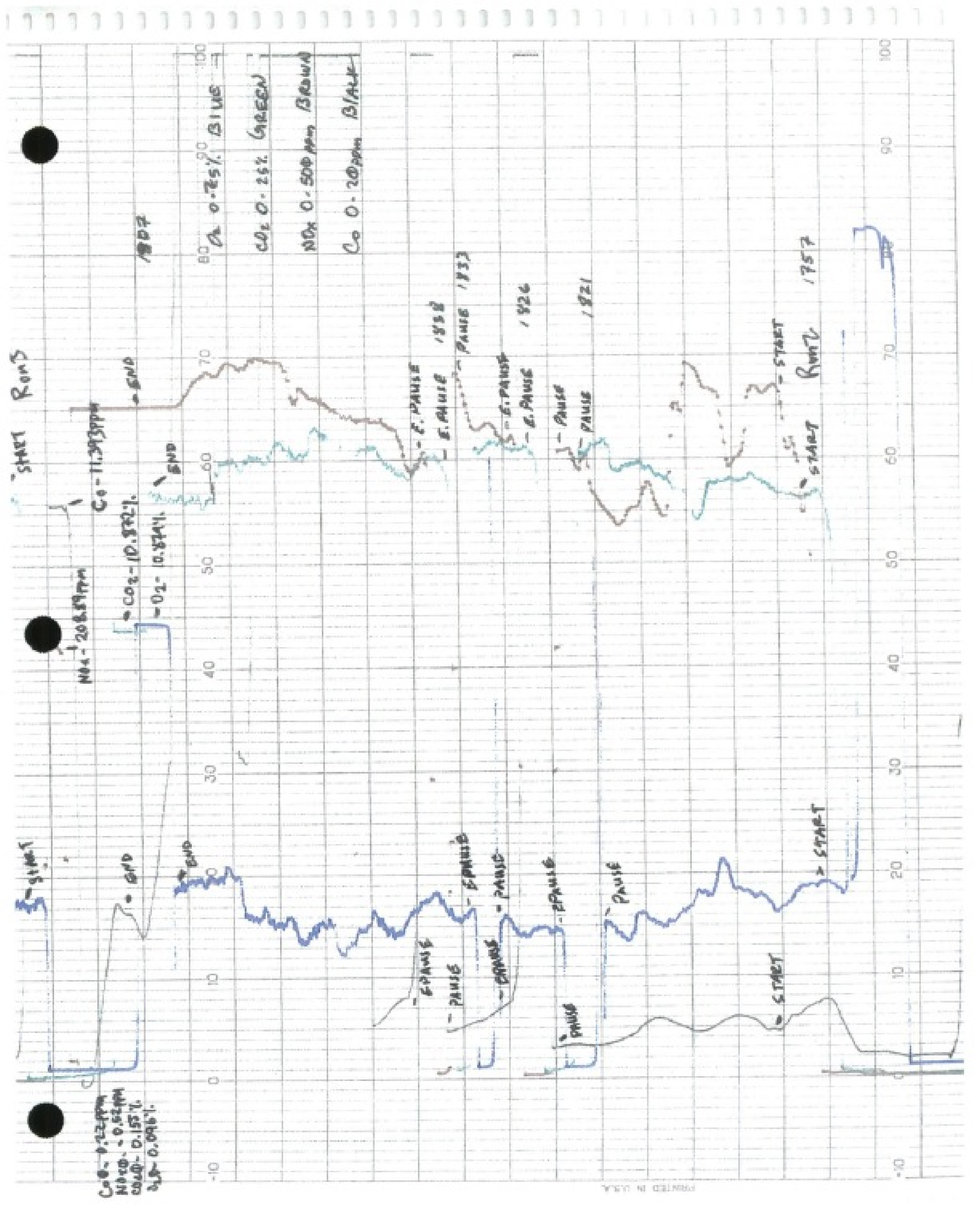

Nox Mid - 216.55ppm
NoxHigh - 453.4ppm
CO2 Mid - 10.462%
O2 Mid - 10.922%
CO2 High - 21.32%
O2 High - 21.582%
CO Ø - 2.7ppm
Nox Ø - -0.62ppm
CO2 Ø - 0.026%
O2 Ø - -0.002%
CAL ERRORS
CO - 931.4ppm
Nox - 454.9ppm
CO2 - 21.345%
O2 - 21.522%
LINSEIS
INITAL CALS
CO Ø - 0.0ppm
Nox Ø - -0.063ppm
CO2 Ø - 0.011%
O2 Ø - 0.005%
INITAL ZERO
Nox - 17.8ppm
NO - 21.31ppm
Nox Converter CK
Nox - 21.46ppm
CO - 0 - 20ppm BLACK
NOx - 0 - 500ppm BROWN
CO2 - 0 - 25% GREEN
O2 - 0 - 25% BLUE
INITAL CHART ZEROS
IST ENERGY
EDWARDS AFB LANDFILL STATION
9.12.12 CHART SPEED @ 2mm/min
TRC PERSONNEL: XAVIER GONZALES
KCAPCD PERSONNEL: NA
PART NO. L0/80IES


UNIT WARMING UP & STABILIZING
NOx- 211.28ppm
CO- 11.474ppm
CO2- 10.673%
-O2- 10.863%
System BIAS CK
CO- 11.442 ppm
NOx- 210.9ppm
CO2- 10.755%
-O2- 10.867%
System BIAS CK
-CO MID- 11.29ppm
CO HIGH- 17.523ppm
CO 0.20ppm
Co 0.20ppm
CoO- 0.47ppm
NOxO- -0.52ppm
CO2O- 0.114%
O2O- 0.093%
CoO- 0.175ppm
NOxO- -0.23ppm
CO2O- 0.125%
O2O- 0.077%
PRINTED IN U.S.A.

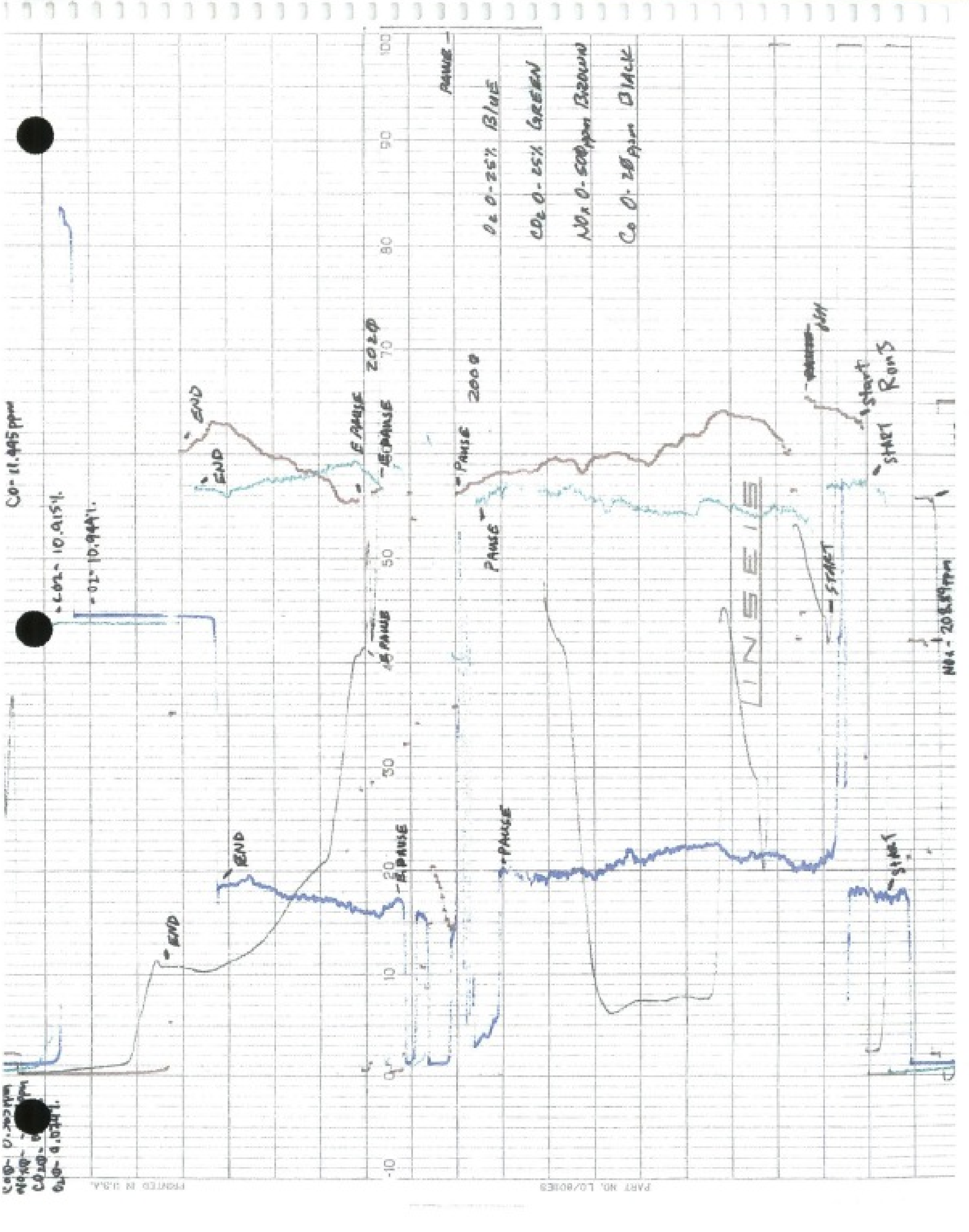


Co 0-20 BLACK
Run 1 1528
START
START
START
START

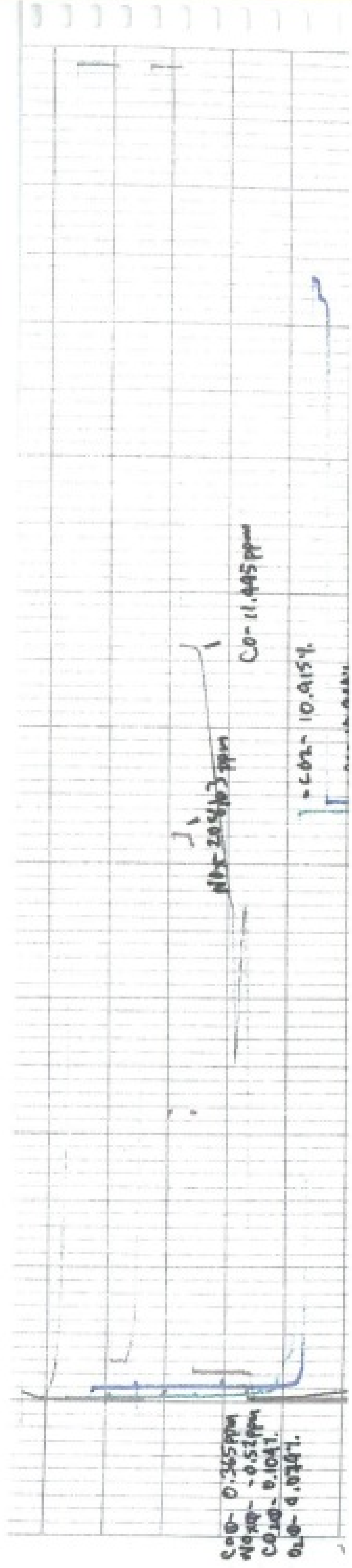

O2 0-25% Blue
CO2 0-25% GREEN
NOx 0-500ppm BROWN
CO 0-20ppm BLACK
CO- 11.59ppm
CO2- 11.094%
O2- 11.073%
16.2%
PART NO. L07/80TES

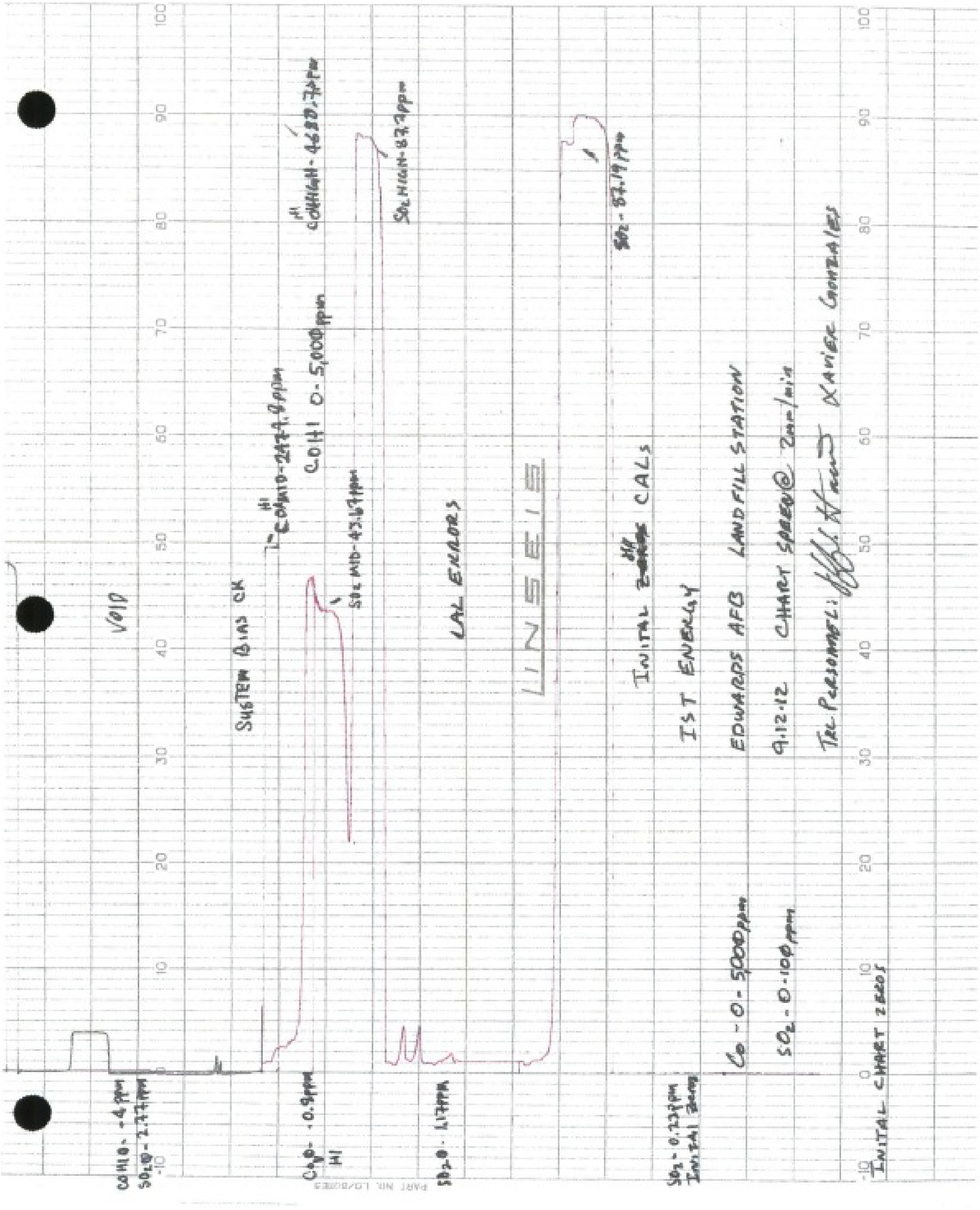


Run3
O2 0-25% BLUE
CO2 0-25% GREEN
NOx 0-500ppm BROWN
CO 0-20ppm BLACK
Run2

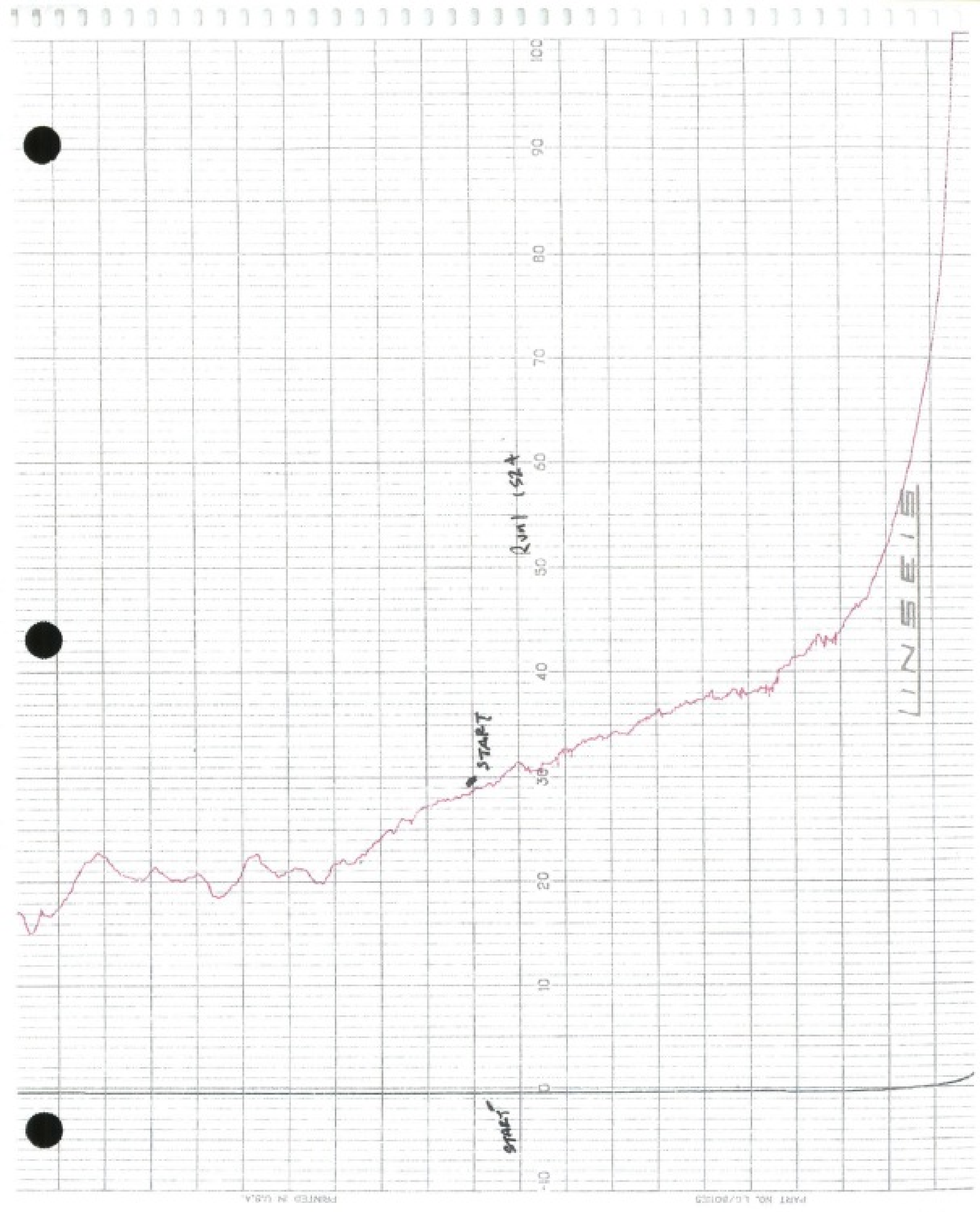


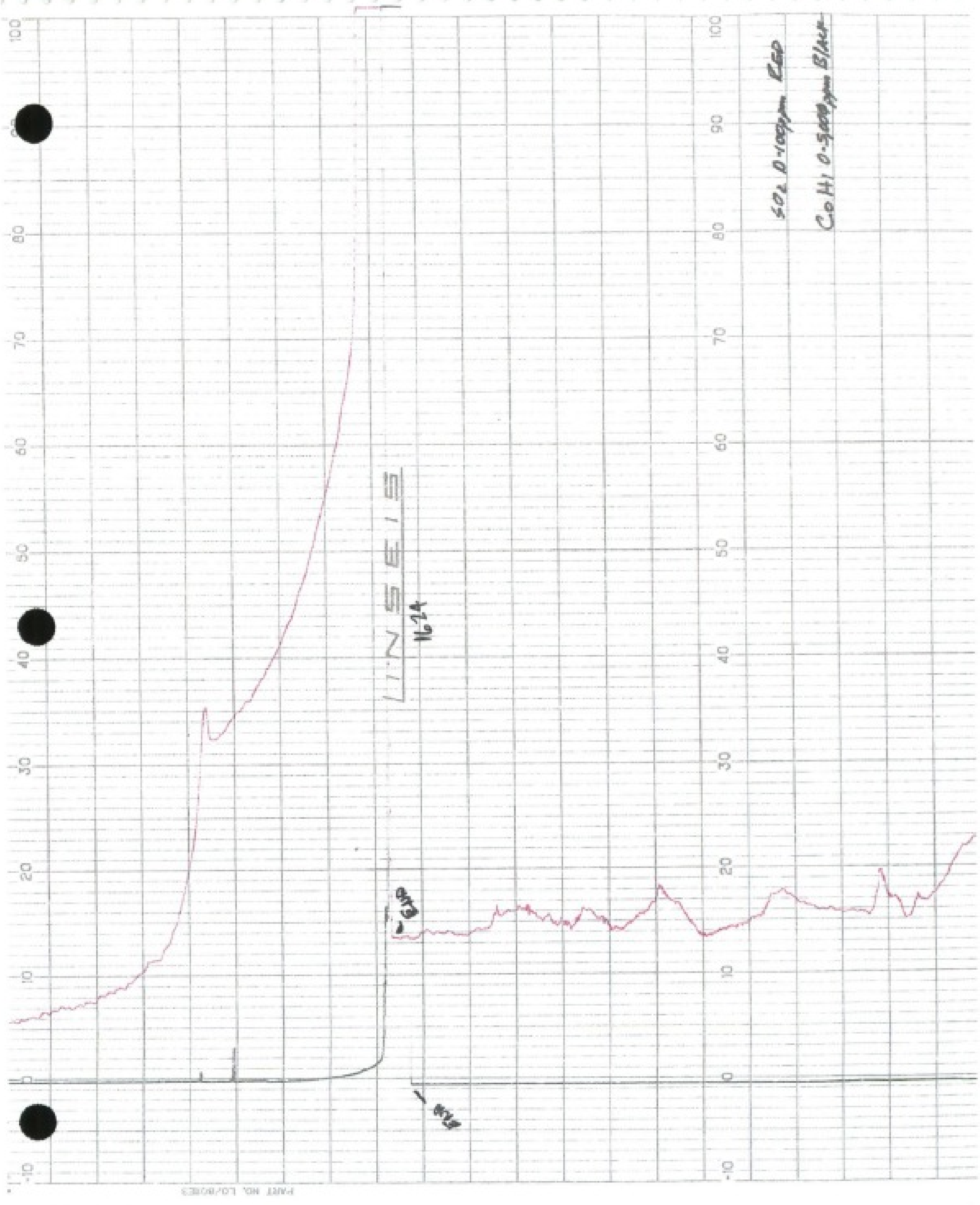
O2 0-25% BLUE
CO2 0-25% GREEN
NOx 0-500ppm BROWN
CO 0-20ppm BLACK
CO- 11.445ppm
CO2- 10.015%
O2- 10.999%
NOx- 208.59ppm
END
PAUSE
START
2000
2010
Start Run 5
PRINTED IN U.S.A.
PART NO. L0/80083
100
90
80
70
50
30
20
10
0
-10

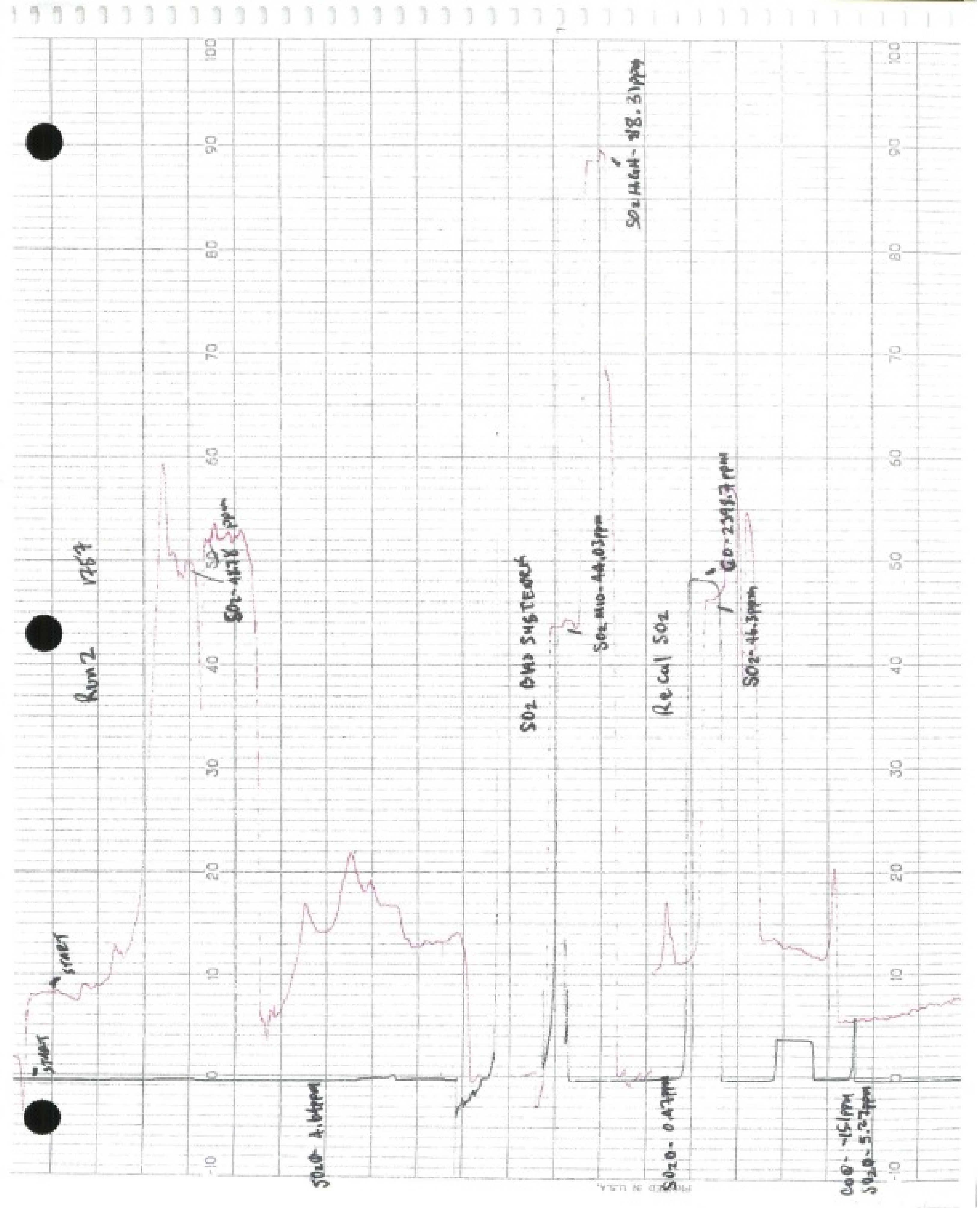

CO- 11,445 ppm
CO2- 10.915%
CO- 0.365PPM
NOX- -0.52PPM
CO2- 0.104%
O2- 4.074%

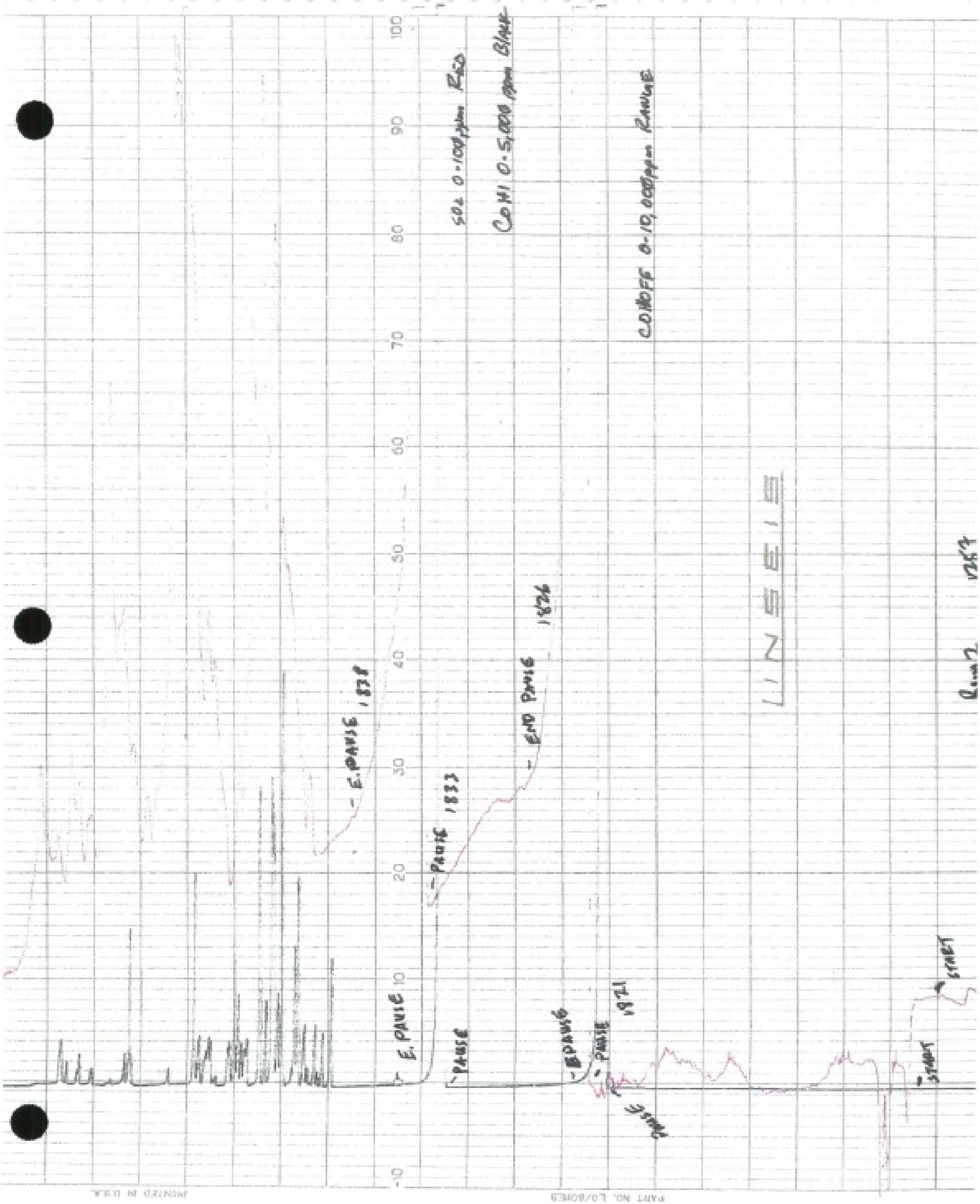

VOID
CO HI 0 - -4 ppm
SO_2 0 - 2.77 ppm
SYSTEM BIAS CK
HI CO MID - 2479.8 ppm
CO 0 - -0.9 ppm HI
CO HI 0 - 5,000 ppm
HI CO HIGH - 4680.7 ppm
SO_2 MID - 43.67 ppm
SO_2 HIGH - 87.7 ppm
SO_2 0 - 1.17 ppm
CAL ERRORS
LINSEIS
SO_2 - 87.19 ppm
INITAL ~~ZERO~~ HI CALs
SO_2 - 0.22 ppm Initial Zero
IST ENERGY
Co - 0 - 5000 ppm
EDWARDS AFB LANDFILL STATION
SO_2 - 0 - 100 ppm
9.12.12 CHART SPEED @ 2mm/min
TRC PERSONNEL: XAVIER GONZALES
INITAL CHART ZEROS
-10
0
10
20
30
40
50
60
70
80
90
100

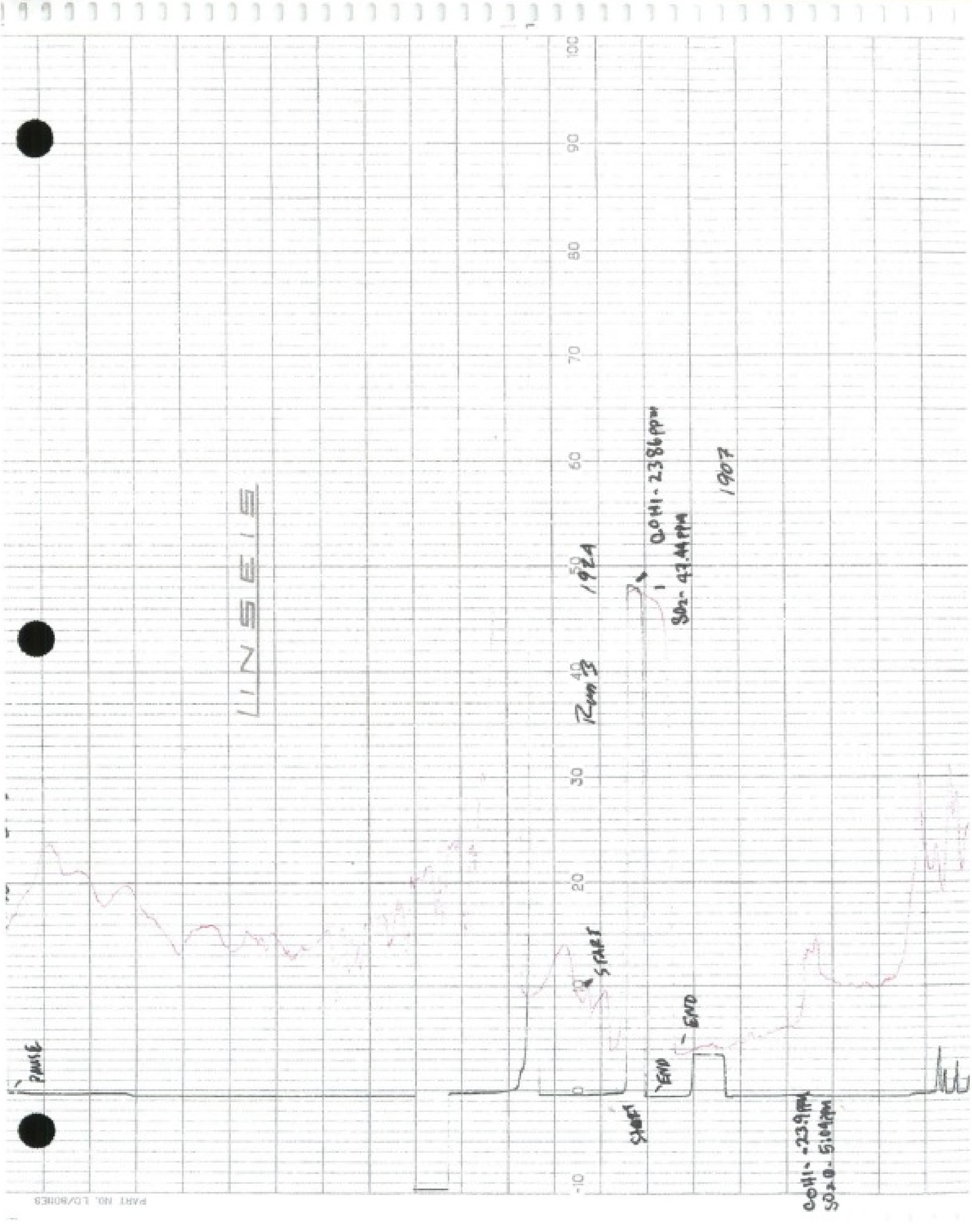
100
90
80
70
60
50
40
30
20
10
0
-10
SO_2: 45.45ppm
COHI- 2405.9ppm
SYSTEM BIAS CK
PRINTED IN U.S.A.

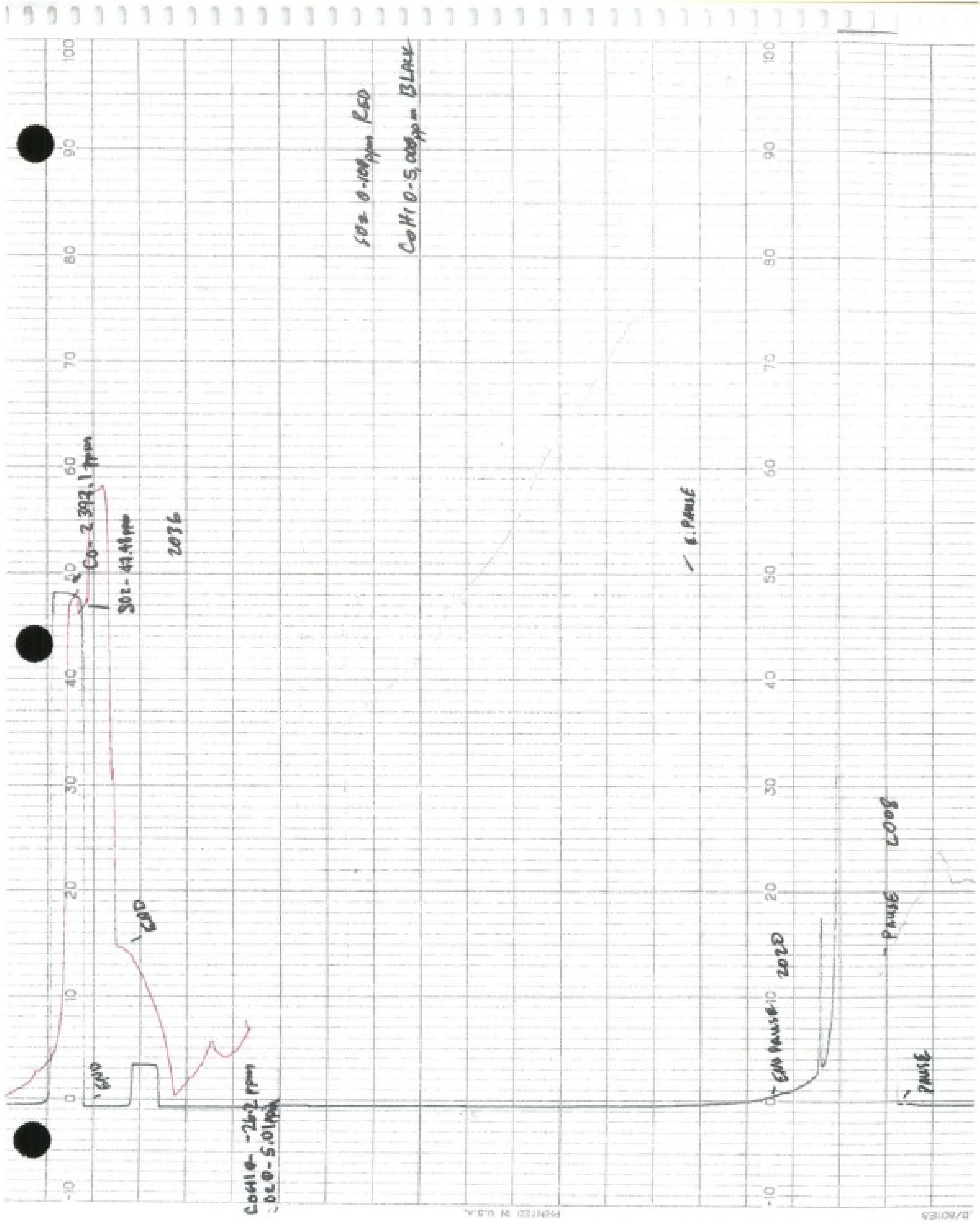

100
90
80
70
60
50
40
30
20
10
0
-10
LINSEIS
START
START

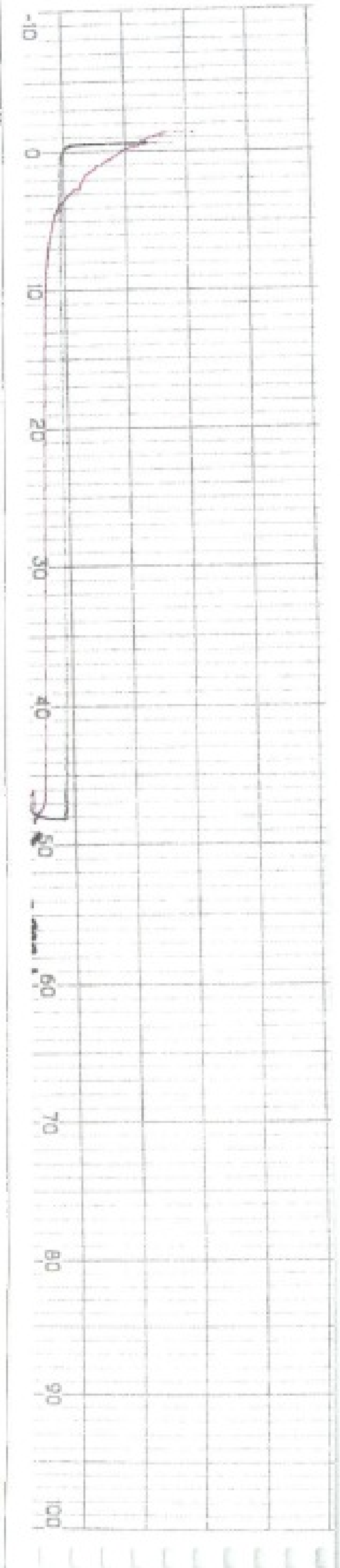

LINSEIS
1624
SO2 0-100ppm Red
C6H14 0-5000ppm Blk
PART NO. LO/BO/OES


Run 2
START
START
Re Cal SO2
100
90
80
70
60
50
40
30
20
10
0
-10


SO2 0-100ppm RED
CO HI 0-5,000 ppm BLACK
CO LOFF 0-10,000ppm RANGE
LINSEIS
E. PAUSE 1838
PAUSE 1833
END PAUSE 1826
E. PAUSE
PAUSE
PAUSE 1921
START
START


LINSEIS
100
90
80
70
60
50
40
30
20
10
0
-10
Run 3
1907
START
END
PAUSE


2036
PAUSE
2020


-10
0
10
20
30
40
50
60
70
80
90
100

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 South Alameda Street
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

Part Number:	E03NI57E15A3973	Reference Number:	48-124308073-1
Cylinder Number:	CC326493	Cylinder Volume:	161 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32012	Valve Outlet:	590
Gas Code:	OC2	Analysis Date:	Mar 22, 2012

Expiration Date: Mar 22, 2015

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON DIOXIDE	21.50 %	21.37 %	G2	+/- 1% NIST Traceable
OXYGEN	21.50 %	21.57 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	090614	CC273756	22.53% OXYGEN/NITROGEN	Aug 01, 2013
NTRM	040604	XC034335B	19.84% CARBON DIOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	Mar 05, 2012
Siemens %O2	PARAMAGNETIC	Feb 23, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Speciality Gases
11711 S. Alameda St.
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

Part Number:	E03NI99E15A0PY5	Reference Number:	48-124288526-5
Cylinder Number:	CC345730	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	660
		Analysis Date:	Nov 04, 2011

Expiration Date: Nov 04, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	215.0 PPM	218.2 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	215.0 PPM	216.9 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			
Total oxides of nitrogen		217.5 PPM		For Reference Only

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	080603	CC255237	250.0PPM CARBON MONOXIDE/NITROGEN	Apr 15, 2012
NTRM	110601	CC330493	248.4PPM NITRIC OXIDE/NITROGEN	Jan 11, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Oct 15, 2011
Nicolet 6700 AMP0900118 NO	FTIR	Oct 14, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059-2130
(323) 357-6881 Fax: (323) 567-3686
http://www.airgas.com

Part Number:	E03NI99E15A70Q0	Reference Number:	48-124246963-4
Cylinder Number:	SG9136267BAL	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jan 05, 2011	Valve Outlet:	660

Expiration Date: Jan 05, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig, i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	450.0 PPM	455.9 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	450.0 PPM	452.9 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			
Total oxides of nitrogen		454.0 PPM		For Reference Only

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	090604	CC287249	501.3PPM CARBON MONOXIDE/NITROGEN	Feb 01, 2013
NTRM	100604	CC316079	495.6PPM NITRIC OXIDE/NITROGEN	Feb 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Dec 09, 2010
Nicolet 6700 AMP0900118 NO	FTIR	Jan 04, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Page 1 of 48-124246963-4

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 South Alameda Street
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

Part Number:	E03NI78E15A0225	Reference Number:	48-124327813-5
Cylinder Number:	CC203664	Cylinder Volume:	152 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32012	Valve Outlet:	590
Gas Code:	OC2	Analysis Date:	Jul 24, 2012

Expiration Date: Jul 24, 2015

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig,i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON DIOXIDE	11.00 %	11.00 %	G1	+/- 1% NIST Traceable
OXYGEN	11.00 %	10.97 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	090602	CC262089	9.961% OXYGEN/NITROGEN	Jan 15, 2013
NTRM	090606	CC262139	9.921% CARBON DIOXIDE/NITROGEN	Apr 10, 2013

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	Jul 18, 2012
Siemens %O2	PARAMAGNETIC	Jun 29, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 South Alameda Street
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

Part Number:	E02NI99E15AC172	Reference Number:	48-124324260-1
Cylinder Number:	SG9168193	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32012	Valve Outlet:	660
Gas Code:	SO2	Analysis Date:	Jul 16, 2012

Expiration Date: Jul 16, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig,i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
SULFUR DIOXIDE	45.00 PPM	45.44 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	110602	CC281060	49.67PPM SULFUR DIOXIDE/NITROGEN	May 13, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 SO2	FTIR	Jun 19, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

Page 1 of 48-124324260-1

Airgas

Airgas Speciality Gases
11711 S. Alameda St.
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0033	Reference Number:	48-124274243-1
Cylinder Number:	SG9128327BAL	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	660
Gas Code:	NC	Analysis Date:	Aug 01, 2011

Expiration Date: Aug 01, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
SULFUR DIOXIDE	85.00 PPM	87.59 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	080615	CC255671	94.67PPM SULFUR DIOXIDE/NITROGEN	Oct 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 SO2	FTIR	Jul 15, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Page 1 of 48-124274243-1

Airgas

Airgas Specialty Gases
11711 S. [illegible] Street
Los Angeles, CA [illegible]
[illegible]
[illegible]

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A3631	Reference Number:	48-124258959-2
Cylinder Number:	CC328031	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Apr 04, 2011	Valve Outlet:	660

Expiration Date: Apr 04, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NOx	11.00 PPM	11.12 PPM	G1	+/- 1% NIST Traceable
CARBON MONOXIDE	11.00 PPM	11.06 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	11.00 PPM	10.87 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	090607	CC253474	9.90PPM NITRIC OXIDE/NITROGEN	Oct 02, 2011
NTRM	090607NOx	CC253474	9.90PPM NOx/NITROGEN	Oct 02, 2011
NTRM	080609	CC255864	10.04PPM CARBON MONOXIDE/NITROGEN	Jun 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900118 CO	FTIR	Mar 08, 2011
California Analytical NO	CLD NO	Mar 16, 2011
California Analitical NOx	CLD NOx	Mar 16, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Page 1 of 48-124258959-2

MATHESON
ask. . .The Gas Professionals™

3106 Pasadena Freeway
Pasadena, TX 77503
713-534-8217

Certificate of Analysis - EPA Protocol Mixtures

Customer:	MELOS	Protocol:	Reference #	Lot#
Cylinder Number:	SX47824	G1	560921-1	1748600767
Cylinder Pressure:	1800 PSIG			
Last Analysis Date:	4/26/2011			
Expiration Date:	4/26/2013			

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 150 PSIG

REPLICATE RESPONSES

Component:	Carbon Monoxide	Date: 1/13/2009	Date: 4/20/2011
		17.47	17.59
Certified Conc:	17.54 ppm +/- 1% rel	17.44	17.56
		17.45	17.57
Component:	Nitric Oxide	Date: 1/13/2009	Date: 4/26/2011
		21.18	21.36
Certified Conc:	21.31 ppm +/- 1% rel	21.17	21.49
		21.23	21.42
BALANCE GAS:	Nitrogen		
		NOx: 21.6 ppm	Reference Only

REFERENCE STANDARDS:

Component:	Carbon Monoxide	Component:	Nitric Oxide
Reference Standard:	SRM	Reference Standard:	SRM
Cylinder #:	CAL16807	Cylinder #:	CAL015413
Concentration:	24.79 PPM	Concentration:	48.52 PPM
Exp. Date:	08/12/2017	Exp. Date:	06/01/2016

CERTIFICATION INSTRUMENTS

Component:	Carbon Monoxide	Component:	Nitric Oxide
Make/Model:	THERMO 42I	Make/Model:	Horiba CLA-510
Serial Number:	903034427	Serial Number:	4LKB3FHH
Measurement Principle:	NDIR	Measurement Principle:	CHEMI
Last Calibration:	04/20/2011	Last Calibration:	04/13/2011

Notes: RECERTIFICATION

This Certification was performed according to EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards September 1997, using procedure G1 and/or G2.

Analyst: DEBRA JACKSON

Date: 04/27/2011

Airgas

Airgas Speciality Gases
11711 S. Alameda St.
Los Angeles, CA 90059
(323) 568-2203 Fax (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0138	Reference Number:	48-124270867-1
Cylinder Number:	CC280625	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	350
Analysis Date:	Jul 07, 2011		

Expiration Date: Jul 07, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	2500 PPM	2509 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	020503	SG9152059	2484PPM CARBON MONOXIDE/NITROGEN	Oct 02, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS CO LOW	NDIR	Jun 28, 2011

Triad Data Available Upon Request

Notes

Approved for Release

Airgas

Airgas Speciality Gases
11711 S. Alameda St.
Los Angeles, CA 90059
(323) 568-2203 Fax: (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0473	Reference Number:	48-124288526-2
Cylinder Number:	SG901852ALB	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	350
		Analysis Date:	Nov 10, 2011

Expiration Date: Nov 10, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	4500 PPM	4675 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	080609	CC255874	5020PPM CARBON MONOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS CO HIGH	NDIR	Oct 14, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

Page 1 of 48-124288526-2

CHAIN OF CUSTODY RECORD

Project Name: IST ENERGY
Project No.:
Sampling Date(s): 9-12-12
Laboratory: TRC BAKERSFIELD, CA
Laboratory P.O. #:
Shipping Airbill No.:
Shipping Date(s): 9-12-12
Shipper's Name: J.HARRIS

EAFB LANDFILL

Sample Code	Sampled Date	Container Size	Container G/P	MATRIX: PARTICULATE	MATRIX: Gaseous Waste Gas	Source Description	ANALYSIS: CARB Method 5	ANALYSIS: ASTM D1945	ANALYSIS: ASTM D3588	Comments
8594	9-12-12	250ml	Poly	X		GENERATOR Row1	X			FAN Bottom
8595		90mm	QUARTZ	X			X			MF
8596		500mls	Glass	X			X			AQUEOUS
8597		250mls	Glass	X			X			ORGANIC
8598		250mls	Poly	X		Row2	X			FAN Bottom
8599		90mm	QUARTZ	X			X			MF
8600		500mls	Glass	X			X			AQUEOUS
8601		250mls	Glass	X			X			ORGANIC
8602		250mls	Poly	X		Row3	X			FAN Bottom
8603		90mm	QUARTZ	X			X			MF
8604		500mls	Glass	X			X			AQUEOUS
8605		250mls	Glass	X			X			ORGANIC
8593		5 Liters	Tedlar		X			X	X	
8608		250mls	Poly	X		BLANK	X			Blank
8609		90mm	QUARTZ	X			X			MF
8610		250mls	Glass	X			X			AQUEOUS
8611		250mls	Glass	X			X			ORGANIC

Relinquished by: J. Harris	Date/Time 9-13-12 / 1221	Relinquished by:	Date/Time
Received by:	Date/Time	Received by:	Date/Time

REMARKS (*):

250

WHITE – LABORATORY YELLOW – OFFICE

TRC Environmental Corporation

ANALYTICAL REPORT

SAMPLE TYPE: Front Half
Nozzle, Probe, Front Half of Filter Holder

TEST DATE: 9/12/2012

SAMPLING METHOD: CARB 5

LOCATION: Generator Stack

SAMPLE COMPONENT: Acetone

ANALYSIS DATE: 10/6/2012

ANALYTICAL METHOD: Gravimetric

ANALYST: Lou Villaruz Project Chemist

LAB NO.: 934

COMPANY NAME: IST Energy

Test	ID#	Vol. (mls)	Uncorrected Wt. (gm)		Corrected Wt. (gm)
1	8594	96	0.0069		0.0060
2	8598	76	0.0021		0.0014
3	8602	125	0.0009	ND	0.0005
Blank	8608	203	0.0019		

"ND" indicates a Non-Detect-results reported at the limit of detection 0.0005 gram

Approved________________________
Lou Villaruz-Project Chemist

ANALYTICAL REPORT

SAMPLE TYPE: Filterable PM

TEST DATE: 9/12/2012

SAMPLING METHOD: CARB 5

LOCATION: Generator Stack

SAMPLE COMPONENT: 82.6 mm Quartz filter

ANALYSIS DATE: 10/6/2012

ANALYTICAL METHOD: Gravimetric

ANALYST: Lou Villaruz

Lou Villaruz Project Chemist

LAB NO.: 934

COMPANY NAME: IST Energy

Test	ID#	Filter No.	Uncorrected Wt. (gm)		Corrected Wt. (gm)
1	8595	423	0.0005	ND	0.0005
2	8599	424	0.0008		0.0008
3	8603	425	0.0019		0.0019
Blank	8609	426	-0.0003		

"ND" indicates a Non-Detect-results reported at the limit of detection 0.0005 gram

Approved Lou Villaruz

Lou Villaruz-Project Chemist

ANALYTICAL REPORT

SAMPLE TYPE: Condensable PM
Aqueous Fraction

TEST DATE: 9/12/2012

SAMPLING METHOD: CARB 5

LOCATION: Generator Stack

SAMPLE COMPONENT: DI H2O

ANALYSIS DATE: 10/11/2012

ANALYTICAL METHOD: Gravimetric

ANALYST: Lou Villaruz Project Chemist

LAB No.: 934

COMPANY NAME: IST Energy

Test	ID#	Vol. (mls)	Uncorrected Wt. (gm)	Corrected Wt. (gm)
1	8596	420	0.0098	0.0079
2	8600	450	0.0125	0.0105
3	8604	490	0.0142	0.0120
Blank	8610	226	0.0010	

"ND" indicates a Non-Detect-results reported at the limit of detection 0.0005 gram

Approved: Lou Villaruz-Project Chemist

ANALYTICAL REPORT

SAMPLE TYPE: Condensable PM
Organic Fraction

TEST DATE: 9/12/2012

SAMPLING METHOD: CARB 5

LOCATION: Generator Stack

SAMPLE COMPONENT: Methylene Chloride

ANALYSIS DATE: 10/11/2012

ANALYTICAL METHOD: Gravimetric

ANALYST: Lou Villaruz
Lou Villaruz Project Chemist

LAB No.: 934

COMPANY NAME: IST Energy

Test	ID#	Vol. (mls)	Uncorrected Wt. (gm)		Corrected Wt. (gm)
1	8597	190	0.0010	ND	0.0005
2	8601	185	0.0047		0.0034
3	8605	180	0.0049		0.0036
Blank	8611	196	0.0014		

"ND" indicates a Non-Detect-results reported at the limit of detection 0.0001 gram

Approved Lou Villaruz
Lou Villaruz Project Chemist

ANALYTICAL REPORT SUMMARY

SAMPLE TYPE(S): Front Half, Filterable PM
Back $Half_{Aq}$, Back $Half_{Org}$

TEST DATE: 9/12/2012

SAMPLING METHOD: CARB 5

LOCATION: Generator Stack

LAB NO.: 934

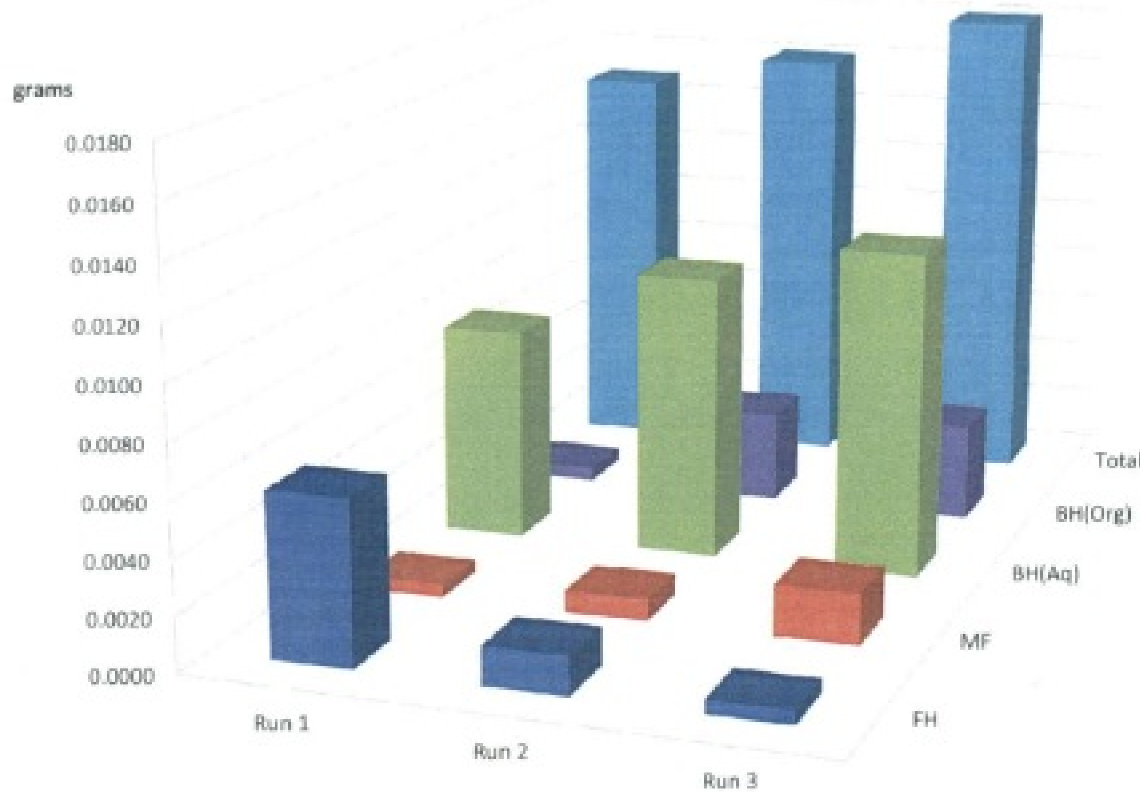
COMPANY NAME: IST Energy

		Test 1	2	3	Avg
Analysis Date: 10/6/2012					
FH	g	0.0060	0.0014	0.0005	0.0026
	mg	6.0	1.4	0.5	2.6
Analysis Date: 10/6/2012					
MF	g	0.0005	0.0008	0.0019	0.0011
	mg	0.5	0.8	1.9	1.1
Analysis Date: 10/11/2012					
$BH_{(Aq)}$	g	0.0079	0.0105	0.0120	0.0101
	mg	7.9	10.5	12.0	10.1
Analysis Date: 10/11/2012					
$BH_{(Org)}$	g	0.0005	0.0034	0.0036	0.0025
	mg	0.5	3.4	3.6	2.5
Total	**g**	**0.0149**	**0.0161**	**0.0180**	**0.0163**
	mg	**14.9**	**16.1**	**18.0**	**16.3**

ANALYTICAL REPORT SUMMARY

SAMPLE TYPE(S): Front Half, Filterable PM
SAMPLING METHOD: CARB 5
LAB NO.: 934

TEST DATE: 9/12/2012
LOCATION: Generator Stack
COMPANY NAME: IST Energy



	Run 1	Run 2	Run 3
FH	0.0060	0.0014	0.0005
MF	0.0005	0.0008	0.0019
BH(Aq)	0.0079	0.0105	0.0120
BH(Org)	0.0005	0.0034	0.0036
Total	0.0149	0.0161	0.0180

Date	5 Oct 12	6 Oct 12			
Time	15:59	1501			
Temp	68.9	73.4			
Pbar/RH%	29.59/51%	29.47/54%			
Std Wt	2.9999	3.0000			
Analyst	LV	LV			
Run	**Front Half Wash**				
1	2.0076	2.0078			
2	2.0111	2.0115			
3	2.0522	2.0521			
BK	2.0757	2.0760			

Comments

Visible residue

Run 1 > Run 2 > Run 3

Sample ID No.	Dish No.
8594	487
8598	488
8602	489
8608	490

Date	SAME	SAME			
Time	AS	AS			
Temp	ABOVE	ABOVE			
Pbar/RH%					
Std Wt	.4999	.5002			
Analyst	LV	LV			
Run	**Mass Filter**				
1	.3480	.3479			
2	.3441	.3437			
3	.3474	.3474			
BK	.3470	.3471			

Comments

Discoloration:

Run 3 > Run 1 = Run 2

Sample ID No.	Filter No.
8595	423
8599	424
8603	425
8609	426

Date	10 Oct 12	10-11-12			
Time	6:37	8:35			
Temp	73.4	73.4			
Pbar/RH%	29.4/44%	29.44/43%			
Std Wt	99.9999	99.9999			
Analyst	LV	DJV			
Run	**Back Half Aqueous**				
1	71.3651	71.3653			
2	71.8690	71.8695			
3	75.3691	75.3694			
BK	68.2092	68.2091			

Comments

Sample ID No.	Dish No.
8596	126
8600	K95
8604	K96
8610	K97

Date	8 Oct 12	10-11-12			
Time	16:41	8:55			
Temp	70.7	73.4			
Pbar/RH%	29.47/49%	29.44/43%			
Std Wt	100.0002	99.9999			
Analyst	LV	DJV			
Run	**Back Half Organic**				
1	63.1498	63.1500			
2	73.9031	73.9027			
3	66.3584	66.3590			
BK	70.0523	70.0524			

Comments

Sample ID No.	Dish No.
8597	K98
8601	K43
8605	X-2
8611	X-18

Notebook BLB13-37

Description: CARB M5

LAB NO.: 958

NAME: IST

LOCATION: Generator Stack Out

DATE: 9/12/12

Front Half Wash

Equation: Final Wt - Tare Wt = Uncorrected Wt - (Blank Wt / Blank Vol) x Sample Vol = Corrected Wt

Run	Final Wt (A)	Tare Wt (B)	Uncorrected Wt (C)	Blank Wt (D)	Blank Vol (E)	Sample Vol (F)	Corrected Wt (G)
Units:	g	g	g	g	mls	mls	g
1	2.0077	2.0008	.0069	.0019	203	96	0.0060
2	2.0113	2.0092	.0021	↓	↓	76	0.0014
3	2.0522	2.0513	.0009	↓	↓	125	0.0005
BK	2.0159	2.0140	.0019				

SIZE: 70mm Aluminum Dish

Bk Wt	
1	0.0009
2	0.0007
3	~~NO~~ ~~0.0007~~ 0.0012

OSV OSV

Mass Filter

Equation: Final Wt - Tare Wt = Uncorrected Wt - (Blank Wt) = Corrected Wt

Run	Final Wt (A)	Tare Wt (B)	Uncorrected Wt (C)	Blank Wt (D)	Corrected Wt (E)
Units:	g	g	g	g	g
1	.3480	.3475	.0005		.0005
2	.3439	.3431	.0008		.0008
3	.3474	.3455	.0019		.0019
BK	.3471	.3474	-.0003		

SIZE: 82.6mm

ABS|.3471-.3474| < .00005

RCD✓ Beaker

Back Half Aqueous

Equation: Final Wt - Tare Wt = Uncorrected Wt - (Blank Wt / Blank Vol) x Sample Vol = Corrected Wt

Run	Final Wt (A)	Tare Wt (B)	Uncorrected Wt (C)	Blank Wt (D)	Blank Vol (E)	Sample Vol (F)	Corrected Wt (G)
Units:	g	g	g	g OSV 0.0010	mls	mls	g
1	71.3652	71.3554	0.0098	~~226~~	226	~~226~~ 420	0.0079
2	71.8693	71.8568	0.0125	0.0010	↓	450	0.0105
3	75.3693	75.3551	0.0142	0.0010	↓	490	0.0120
BK	68.2092	~~68.2082~~ 68.2082 -OSV	0.0010				

SIZE: 50x70 mm

Bk Wt	
1	0.0019
2	0.0020
3	0.0022

RCD✓ Beaker

Back Half Organic

Equation: Final Wt - Tare Wt = Uncorrected Wt - (Blank Wt / Blank Vol) x Sample Vol = Corrected Wt

Run	Final Wt (A)	Tare Wt (B)	Uncorrected Wt (C)	Blank Wt (D)	Blank Vol (E)	Sample Vol (F)	Corrected Wt (G)
Units:	g	g	g	g OSV 0.0014	mls	mls	g
1	63.1499	63.1489	0.0010	~~196~~	196	190	0.0005
2	73.9029	73.8982	0.0047	0.0014	↓	185	0.0034
3	66.3592	66.3543	0.0049	0.0014	↓	180	0.0036
BK	70.0524	70.0510	0.0014				

SIZE: 50x70 mm

Bk Wt	
1	~~NO~~ 0.0013
2	0.0013
3	0.0013

Notebook BLB13-38

TRC

2820 Pegasus Drive, Suite 1
Bakersfield, CA 93308

Telephone# 661.399.1396
Fax# 661.393.8306

Sampled:	9/12/2012	Client Name:	IST Energy	Project No.:	- - -
Time Sampled:	- - -	Location/Unit:	Generator Engine	Lab No.:	FW14
Submitted:	9/13/2012	Source:	Waste Gas Line to Engine	TRC ID No.	8593
Analyzed:	9/13/2012	Type of Gas:	Other	Client ID NO.:	8593

Analysis of Natural Gas by Gas Chromatography ASTM D 1945-96 2003
Determination of Heat Value, Compressibility Factor, and Relative Density ASTM D 3588-98 (Reapproved 2003)
GPA Standard 2145-96

ASTM D1945-96						GPA 2145-96
Constituent	**mol %**	**wt %**	CHONS		**H/C Ratio**	**Gas Liquids, gals/1000 ft^3**
n-Butane	0.00	0.00			0.16	0.000 n-Butane
Carbon Dioxide	16.95	25.46		weight %		
Ethane	1.00	1.02	Carbon	13.96		
Helium	0.00	0.00	Hydrogen	2.22		
i-Butane	0.11	0.22	Oxygen	21.65		0.047 i-Butane
i-Pentane	0.00	0.00	Nitrogen	62.17		0.000 i-Pentane
Nitrogen	65.02	62.17	Sulfur	0.00		
n-Pentane	0.00	0.00				0.000 n-Pentane
Propane	0.31	0.46				0.085 Propane
Methane	13.74	7.52				
Hydrogen	0.00	0.00				
n-Hexane	0.00	0.00				
Hydrogen Sulfide	0.00	0.00				
Oxygen	2.88	3.14				
Totals	100.00	100.00		100.00		0.132

ASTM D3588-98

Gas Properties calculated @ 60 F and 14.696 PSIA

Density lb/ft^3	0.07720						
Specific Volume, ft^3 / lb	12.95						
Compressibility Factor, Z	0.9990						
	HHV	LHV		HHV GROSS HEATING VALUE		LHV NET HEATING VALUE	
				BTU / ft^3	BTU / lb	BTU / ft^3	BTU / lb
f-factor @ 68, dscf/MMBTU	12956	14343					
f-factor @ 70, dscf/MMBTU	13005	14398					
f-factor @ 60, dscf/MMBTU	12760	14126	dry	167.7	2172.3	151.5	1962.2
			wet	164.8	2134.4	148.8	1928.0
fc-factor @ 68, dscf/MMBTU	2060	2281	dry*	**167.9**	**2174.6**	**151.6**	**1964.2**
fc-factor @ 70, dscf/MMBTU	2068	2289	wet*	165.0	2136.6	149.0	1930.0
fc-factor @ 60, dscf/MMBTU	2029	2246					

SPECIFIC GRAVITY
1.0116
* Corrected for Compressibility (Ideal Volume) 1.0126 *

MATHESON TRI•GAS
Cylinder No.: EA13692

Lou Villaruz

Analyst: Lou Villaruz (Lab Manager)

12091169

CHAIN OF CUSTODY RECORD

Project Name: IST ENERGY
Project No.: C300346
Sampling Date(s): 9.12.12
Laboratory: ZALCO BAKERSFIELD, CA
Laboratory P.O. #:
Shipping Airbill No.: 9.12.12
Shipping Date(s):
Shipper's Name: J.J. HARRIS

EAFB LANDFILL

Sample Code	Sampled Date	Container Size	Container G/P	MATRIX: DIESEL FUEL	MATRIX: GASEOUS WASTE GAS	Source Description	ANALYSIS: ASTM 3120 SULFUR	ANALYSIS: ASTM 240 BTU	ANALYSIS: ASTM FOR CHLORS	ANALYSIS: ASTM D3246	Comments
8606	9.12.12	500ml	Glass	X		GENERATOR	X	X	X		27.6
8607	9/12/12	5 liter	TEDLAR		X	↓				X	

Relinquished by: [signature] Date/Time 9.13.12 / 1234
Received by: Date/Time

Relinquished by: [signature] Date/Time
Received by: [signature] Date/Time 9/13/12 1000

~~Samples Subject~~ ~~Printed~~ ☐ ☐
Sampled Short Hold Time ☐ ☐

REMARKS (*):

WHITE – LABORATORY YELLOW – OFFICE

TRC
TRC Environmental Corporation

2507

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

4309 Armour Avenue
Bakersfield, California 93308

(661) 395-0539
FAX (661) 395-3069

TRC Environmental Corp. 2620 Pegasus Rd, Ste. 1 Bakersfield, CA 93308	Project: Gas Analysis Project #: C300346 Attention: Jeff Harris	Work Order No.: 1209169 Reported: 09/27/2012 Received: 09/13/2012 16:00

Lab Sample ID: 1209169-01	Collected By:
Client Sample ID: 8606 Generator	Date Collected: 9/12/2012 12:00:00AM

Analyte	Results	PQL	Units	Flag	Method	Date Prepared	Date Analyzed	Init.
Heating Value								
Gross, Cal/g	11010		Cal/g		ASTM D 240	9/13/12	9/13/12	JAH
Gross, BTU/lb	19820		Btu/lb		ASTM D 240	9/13/12	9/13/12	JAH
Gross, BTU/gal	138600		Btu/gal		ASTM D 240	9/13/12	9/13/12	JAH
Gross, BTU/BBL	5823000		Btu/bbl		ASTM D 240	9/13/12	9/13/12	JAH
Net, BTU/lb	18610		Btu/lb		ASTM D 240	9/13/12	9/13/12	JAH
Net, BTU/bbl	5467000		Btu/bbl		ASTM D 240	9/13/12	9/13/12	JAH
Petroleum Chemistry								
Sulfur, Total	11	1.0	ppm		ASTM D 3120	9/17/12	9/17/12	JAH
Ultimate Analysis								
Carbon	85.37	0.05	Wt. %		ASTM D5373	9/27/12	9/27/12	JAH
Hydrogen	13.28	0.05	Wt. %		ASTM D5373	9/27/12	9/27/12	JAH
Oxygen	1.35	0.05	Wt. %		ASTM D5373	9/27/12	9/27/12	JAH
Nitrogen	<0.05	0.05	Wt. %		ASTM D5373	9/27/12	9/27/12	JAH

NSS: Non Sufficient Sample H: Exceeds Analysis Hold Time TTLC: Total Threshold Limit Concentration STLC: Soluble Threshold Limit Concentration TCLP: Toxicity Characteristic Leaching Procedure MCL: Maximum Contaminant Level *: See Case Narrative

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Note: Samples analyzed for regulatory purposes should be put on ice immediately after sampling and received by the laboratory at temperatures between 0-6°C. Microbiological analysis requires samples to be at least 4-10°C when received at the laboratory. For additional information regarding the limitations of the method(s) referred to, please call us at 661-395-0539.

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

4309 Armour Avenue
Bakersfield, California 93308

(661) 395-0539
FAX (661) 395-3069

TRC Environmental Corp.	Project: Gas Analysis	Work Order No.: 1209169
2620 Pegasus Rd, Ste. 1	Project #: C300346	Reported: 09/27/2012
Bakersfield, CA 93308	Attention: Jeff Harris	Received: 09/13/2012 16:00

Lab Sample ID: 1209169-02	Collected By:
Client Sample ID: 8607 Generator	Date Collected: 9/12/2012 12:00:00AM

Analyte	Results	PQL	Units	Flag	Method	Date Prepared	Date Analyzed	Init.
Gas & Air Testing								
Total Sulfur	11	1.0	ppm		ASTM D 3246/M	9/14/12	9/14/12	JAH
Total Sulfur/Hydrogen Sulfide by ASTM D3246								
Sulfur	0.66	0.06	gr/100 scf		ASTM D3246	9/14/12	9/14/12	JAH

NSS: Non Sufficient Sample H: Exceeds Analysis Hold Time TTLC: Total Threshold Limit Concentration STLC: Soluble Threshold Limit Concentration TCLP: Toxicity Characteristic Leaching Procedure MCL: Maximum Contaminant Level *: See Case Narrative

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Note: Samples analyzed for regulatory purposes should be put on ice immediately after sampling and received by the laboratory at temperatures between 0-6°C. Microbiological analysis requires samples to be at least 4-10°C when received at the laboratory. For additional information regarding the limitations of the method(s) referred to, please call us at 661-395-0539.

CHAIN OF CUSTODY RECORD

Project Name: IST Energy
Project No.:
Sampling Date(s): 09/12/12
Laboratory: AAC
Laboratory P.O.: Unavailable
Shipping Date(s):
Shipper's Name:

Sample Code	Sampled Date	Container Size	Container G/P	MATRIX: Aqueous	Organic Solvent	Ash/Soil/Sediment (Solid)	Acidic	Basic	Gas	IC Engine Outlet Stack Description	ANALYSIS: Trace Metals*	Mercury	HCl	Cl2	Particulate Matter	PCDD/PCDF	Semivolatile Organics	VOC/TOC SCAQMD 25.3	Physical Parameters*	Iodometric Titration				Comments
AFB-WTE-01 ✓	09/12/12	20 mL	G	X						Vial A Run 1								X						
AFB-WTE-02 ✓	09/12/12	6 L	SS						X	Canister Run 1								X						
AFB-WTE-03 ✓	09/12/12	20 mL	G	X						Vial B Run 1								X						
AFB-WTE-04 ✓	09/12/12	6 L	SS						X	Canister dup Run 1								X						
AFB-WTE-05 ✓	09/12/12	20 mL	G	X						Vial C Run 2								X						
AFB-WTE-06 ✓	09/12/12	6 L	SS						X	Canister Run 2								X						
AFB-WTE-07 ✓	09/12/12	20 mL	G	X						Vial D Run 2								X						
AFB-WTE-08 ✓	09/12/12	6 L	SS						X	Canister dup Run 2								X						
AFB-WTE-09 ✓	09/12/12	20 mL	G	X						Vial E Run 3								X						
AFB-WTE-10 ✓	09/12/12	6 L	SS						X	Canister Run 3								X						
AFB-WTE-11 ✓	09/12/12	20 mL	G	X						Vial F Run 3								X						
AFB-WTE-12 ✓	09/12/12	6 L	SS						X	Canister dup Run 3								X						
TripBK-01 ✓	09/12/12	20 mL	G	X						Trip Blank								X						
TripBK-02 ✓	09/12/12	20 mL	G	X						Trip Blank								X						
TripBK-03 ✓	09/12/12	20 mL	G	X						Trip Blank								X						

Relinquished by: [illegible] **Date/Time:** 9.13.12 / 1233
Received by: **Date/Time:**

Relinquished by: **Date/Time:**
Received by: [illegible] **Date/Time:** 9/14 9:10

TRC

Atmospheric Analysis & Consulting, Inc.

CLIENT : TRC Environmental Corporation
PROJECT NAME : IST Energy
AAC PROJECT NO. : 120870
REPORT DATE : 09/20/2012

On September 14, 2012, Atmospheric Analysis & Consulting, Inc. received six (6) Six-Liter Summa Canisters and six (6) Impinger vials for TNMNEOC analysis by SCAQMD 25.3 and Fixed Gases analysis by EPA 3C. Upon receipt the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Initial Pressure (mmHg)
AFB-WTE-01,02	120870-58437	497.5
AFB-WTE-03,04	120870-58438	484.9
AFB-WTE-05,06	120870-58439	539.0
AFB-WTE-07,08	120870-58440	534.2
AFB-WTE-09,10	120870-58441	448.2
AFB-WTE-11,12	120870-58442	455.8

SCAQMD 25.3 Analysis - An aliquot of the gaseous sample is injected into the GC/FID and an aliquot of the impinger sample is injected into the TOC Analyzer for analysis following SCAQMD 25.3 as specified in the SOW.

EPA 3C Analysis - An aliquot of the gaseous sample is injected into the GC/TCD for analysis following EPA 3C as specified in the SOW.

No problems were encountered during receiving, preparation and/or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# AACI-SCAQMD 25.3 and EPA 3C.

I certify that this data is technically accurate, complete and in compliance with the terms and conditions of the contract. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Director or his designee, as verified by the following signature.

If you have any questions or require an explanation of your data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 58 pages.

1534 Eastman Ave., Ste. A • Ventura, • CA 93003 www.aaclab.com • (805) 650-1642 • FAX (805) 650-1644

Atmospheric Analysis & Consulting, Inc

SAMPLE RECEIPT / LOG-IN REPORT

AAC Project **120870**

Received By: **J. Zachman**

Sample Receipt Date	Project Desc	Clients ID	Matrix	Sampling Date/Time	Sampled By	Sample #	Analysis Requested
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-01,02	Canister & Impinger	9/12/2012	Client	58437	SCAQMD 25.3
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-03,04	Canister & Impinger	9/12/2012	Client	58438	SCAQMD 25.3
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-05,06	Canister & Impinger	9/12/2012	Client	58439	SCAQMD 25.3
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-07,08	Canister & Impinger	9/12/2012	Client	58440	SCAQMD 25.3
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-09,10	Canister & Impinger	9/12/2012	Client	58441	SCAQMD 25.3
9/14/2012 1200	TRC Environmental Corporation IST Energy	AFB-WTE-11,12	Canister & Impinger	9/12/2012	Client	58442	SCAQMD 25.3

TURN AROUND TIME: Normal (10days)

Lab Due Date: 9/21/2012

Total Samples: 6

REMARKS:
Client returned 3.5 x 23.3 sets (7 trains). One train was unused.

CANISTER PRESSURE LOG

Client: TRC Environmental Corpora   Project No.: 120870

Date: 9/14/2012

Canister #	Sample #	Initial Pressure	Final Pressure
067	58437	497.5	906.3
093	58438	484.9	901.8
112	58439	539.0	903.8
158	58440	534.2	904.8
210	58441	448.2	905.1
014	58442	455.8	909.7

1

AA # 120870

CHAIN OF CUSTODY RECORD

Page 4

Project Name: IST ENERGY
Project No.: 197154
Sampling Date(s): 09/12/12
Laboratory: AAC
Laboratory P.O.: Unavailable
Shipping Date(s):
Shipper's Name:

Sample Code		Sampled Date	Container Size	Container G/P	MATRIX: Aqueous	Organic Solvent	Ash/Soil/Sediment (Solid)	Acidic	Basic	Gas	IC Engine Outlet Stack Description	ANALYSIS: Trace Metals*	Mercury	HCl	Cl2	Particulate Matter	PCDD/PCDF	Semivolatile Organics	VOC/TOC: SCAQMD 25.3	Physical Parameters*	Iodometric Titration	Comments
AFB-WTE-01	✓	09/12/12	20 mL	G	X						Vial A Run 1								X			
AFB-WTE-02	✓	09/12/12	6 L	SS						X	Canister Run 1								X			58437
AFB-WTE-03	✓	09/12/12	20 mL	G	X						Vial B Run 1								X			
AFB-WTE-04	✓	09/12/12	6 L	SS						X	Canister dup Run 1								X			58438
AFB-WTE-05	✓	09/12/12	20 mL	G	X						Vial C Run 2								X			
AFB-WTE-06	✓	09/12/12	6 L	SS						X	Canister Run 2								X			58439
AFB-WTE-07	✓	09/12/12	20 mL	G	X						Vial D Run 2								X			
AFB-WTE-08	✓	09/12/12	6 L	SS						X	Canister dup Run 2								X			58440
AFB-WTE-09	✓	09/12/12	20 mL	G	X						Vial E Run 3								X			
AFB-WTE-10	✓	09/12/12	6 L	SS						X	Canister Run 3								X			58441
AFB-WTE-11	✓	09/12/12	20 mL	G	X						Vial F Run 3								X			
AFB-WTE-12	✓	09/12/12	6 L	SS						X	Canister dup Run 3								X			58442
TripBK-01	✓	09/12/12	20 mL	G	X						Trip Blank								X			
TripBK-02	✓	09/12/12	20 mL	G	X						Trip Blank								X			
TripBK-03	✓	09/12/12	20 mL	G	X						Trip Blank								X			

Relinquished by: [signature] Date/Time: 9.13.12 / 1233
Received by: [signature] Date/Time: 9/14/2012 1200
Relinquished by: Date/Time:
Received by: [signature] Date/Time: 9/14 9:10

TRC

Equipment Prep Sheets

Atmospheric Analysis & Consulting, Inc

Equipment Preparation Data Sheet
SCAQMD Method 25.3

Analyst: WH Date and Time: 9/10/2012 8:00

Client: : TRC Environmental Corp Project Name: IST Energy

Thermometer ID: #5 Gauge ID: Ashcroft Box #: 000336

SAMPLE	1
Can #	067
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.2
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	A
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

SAMPLE	2
Can #	093
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.0
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	B
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

Atmospheric Analysis & Consulting, Inc

Sample Receiving Data Sheet
SCAQMD Method 25.3

Analyst: WH Project # 120870 Courier: Drop Off

Sample Receiving Date and Time: 9/14/2012 12:00

Thermometer ID: #5 Gauge ID: Ashcroft Box #: 000336

SAMPLE	1
Sample ID	58437
Can #	067
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.2
Return Pressure (mmHg)	497.5
Vial #	A
Imp #	NA
Return Volume (mL)	10.3
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	2:20 PM
Purge End Time	2:30 PM
Post Purge Pres (mmHg)	552.7
Final Pressure (mmHg)	906.3
Dilution Factor	1.82

Comments:

SAMPLE	2
Sample ID	58438
Can #	093
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.0
Return Pressure (mmHg)	484.9
Vial #	B
Imp #	NA
Return Volume (mL)	10.2
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	2:40 PM
Purge End Time	2:50 PM
Post Purge Pres (mmHg)	546.0
Final Pressure (mmHg)	901.8
Dilution Factor	1.86

Comments:

Atmospheric Analysis & Consulting, Inc.

Equipment Preparation Data Sheet
SCAQMD Method 25.3

Analyst: WH Date and Time: 9/10/2012 8:00

Client: : TRC Environmental Corp Project Name: IST Energy

Thermometer ID: #5 Gauge ID: Ashcroft Box #: 000565

SAMPLE	3
Can #	112
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.3
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	C
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

SAMPLE	4
Can #	158
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.2
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	D
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

Atmospheric Analysis & Consulting, Inc

Sample Receiving Data Sheet
SCAQMD Method 25.3

Analyst: WH Project # 120870 Courier: Drop Off

Sample Receiving Date and Time: 9/14/2012 12:00

Thermometer ID: #5 Gauge ID: Ashcroft Box #: 000565

SAMPLE	3
Sample ID	58439
Can #	112
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.3
Return Pressure (mmHg)	539.0
Vial #	C
Imp #	NA
Return Volume (mL)	7
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	3:00 PM
Purge End Time	3:10 PM
Post Purge Pres (mmHg)	605.3
Final Pressure (mmHg)	903.8
Dilution Factor	1.68

SAMPLE	4
Sample ID	58440
Can #	158
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.2
Return Pressure (mmHg)	534.2
Vial #	D
Imp #	NA
Return Volume (mL)	6
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	3:20 PM
Purge End Time	3:30 PM
Post Purge Pres (mmHg)	595.6
Final Pressure (mmHg)	904.8
Dilution Factor	1.69

Comments:

Comments:

Atmospheric Analysis & Consulting, Inc.

Equipment Preparation Data Sheet
SCAQMD Method 25.3

Analyst: WH		Date and Time:	9/10/2012 8:00
Client: : TRC Environmental Corp		Project Name: IST Energy	
Thermometer ID: #5		Gauge ID: Ashcroft	Box #: 000357

SAMPLE	5
Can #	210
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.3
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	E
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

SAMPLE	6
Can #	014
Can Cleaning Date	8/22/2012
Initial Pressure (mmHg)	6.0
Flow #	NA
Flow Cleaning Date	9/10/2012
Impinger #	NA
Impinger Cleaning Date	9/10/2012
Vial #	F
HPLC Water Lot #	L090412 A3
Probes washed	Y
Probes Baked in Oven	Y
System Purged	Y
Leak Checked	Y
Gauge Checked	Y

Comments:

Atmospheric Analysis & Consulting, Inc

Sample Receiving Data Sheet
SCAQMD Method 25.3

Analyst: WH Project # 120870 Courier: Drop Off

Sample Receiving Date and Time: 9/14/2012 12:00

Thermometer ID: #5 Gauge ID: Ashcroft Box #: 000357

SAMPLE	5
Sample ID	58441
Can #	210
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.3
Return Pressure (mmHg)	448.2
Vial #	E
Imp #	NA
Return Volume (mL)	9.9
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	3:40 PM
Purge End Time	3:50 PM
Post Purge Pres (mmHg)	497.8
Final Pressure (mmHg)	905.1
Dilution Factor	2.02

Comments:

SAMPLE	6
Sample ID	58442
Can #	014
Flow #	NA
Tank vol	6L
InitialPressure (mmHg)	6.0
Return Pressure (mmHg)	455.8
Vial #	F
Imp #	NA
Return Volume (mL)	9.9
Temperature	8 C
Purged Date	09/18/2012
Purge Start Time	4:00 PM
Purge End Time	4:10 PM
Post Purge Pres (mmHg)	514.8
Final Pressure (mmHg)	909.7
Dilution Factor	2.00

Comments:

Results

BAK2012-159R

G-27

JST Energy

Atmospheric Analysis & Consulting, Inc.

LABORATORY ANALYSIS REPORT

CLIENT : TRC Environmental Corp
PROJECT NO. : 120870
MATRIX : Air
UNITS : ppmC

SAMPLING DATE : 09/12/2012
RECEIVING DATE : 09/14/2012
ANALYSIS DATE : 09/19-20/2012
REPORT DATE : 09/20/2012

ANALYSIS METHOD: SCAQMD 25.3

Client ID	Lab ID #	Tank Vol Liters (V_{Tank})	Initial Pressure mmHg (P_i)	Return Pressure mmHg (P_r)	Final Pressure mmHg (P_f)	Sample Vol. (L) (V_{Sample})	Tank Dil Factor (DF_{Tank})	NMNEOC Tank (C_{Tank})	NMNEOC Trap (C_{Trap})	TNMNEOC (Total VOC ppmC)
AFB-WTE-01,02	120870-58437	6.00	6.2	497.5	906.3	3.88	1.82	0.6	6.3	7.5
AFB-WTE-03,04	120870-58438	6.00	6.0	484.9	901.8	3.78	1.86	0.6	4.2	5.2
AFB-WTE-05,06	120870-58439	6.00	6.3	539.0	903.8	4.21	1.68	194	15.6	228
AFB-WTE-07,08	120870-58440	6.00	6.2	534.2	904.8	4.17	1.69	187	15.0	219
AFB-WTE-09,10	120870-58441	6.00	6.3	448.2	905.1	3.49	2.02	230	20.0	272
AFB-WTE-11,12	120870-58442	6.00	6.0	455.8	909.7	3.55	2.00	234	17.7	274

*** TNMNEOC Includes Bias Correction=1.086, as per method**
MDL = 0.1 ppmV (as propane) x 3(carbon conversion) x Tank Dil Factor

EPA METHOD 3C

Reporting Limit 0.10%		Analyte		
Client ID	Lab ID #	Oxygen	CO	CO2
AFB-WTE-01,02	120870-58437	3.9	<PQL	16.5
AFB-WTE-03,04	120870-58438	4.6	<PQL	15.0
AFB-WTE-05,06	120870-58439	4.7	<PQL	15.3
AFB-WTE-07,08	120870-58440	4.4	<PQL	15.8
AFB-WTE-09,10	120870-58441	4.5	<PQL	16.0
AFB-WTE-11,12	120870-58442	4.4	<PQL	16.2

PQL = 0.10 % (RL) x Tank Dil Factor

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Method 25.3 Calculation Summary Sheet

- **TOC Calculations (Trap):**

$$C_{Trap} = \frac{(C_{Toc} \times V_{Trap})}{(V_{Sample})} \times \frac{V_{id}}{MW_c}$$

Where:

C_{Trap} = Gaseous concentration of TOC in condensate trap water, ppmv (as Carbon)
C_{Toc} = TOC concentration in ug/ml of condensate trap water *(from Raw Data printout)*
V_{Trap} = Volume of condensate trap water in ml *(from Sample Receiving Data Sheet)*
V_{id} = Volume of ideal gas per mole at 25°C (24.4652 liters/mole)
MW_c = Atomic weight of carbon (12.01 g/mol)
V_{Sample} = Volume sampled in collection tank in Liters (V_{Tank} x ($P_r - P_i$ / P_a)

Where:

V_{Tank} = Volume of the sampling tank in liters *(from Sample Receiving Data Sheet)*
P_r = Return canister pressure of the sampling tank *(from Sample Receiving Data Sheet)*
P_i = Initial canister pressure of the sampling tank *(from Sample Receiving Data Sheet)*
P_a = atmospheric pressure (760 mmHg)

- **TCA Calculations (Tank):**

$$C_{Tank} = C_{TCA} \times DF_{Tank} \times 3.0$$

Where:

C_{Tank} = Gaseous concentration of tank, ppmv (as Carbon)
C_{TCA} = Average of analysis results from chromatograms, ppmv (as Propane)
DF_{Tank} = Dilution factor resulting from tank pressurization upon receipt (P_f/P_r)
3.0 = Conversion of result (as Propane) to (as Carbon)

Where:

P_f = Final canister pressure after pressurization for analysis *(from Sample Receiving Data Sheet)*
P_r = Return canister pressure upon sample receipt *(from Sample Receiving Data Sheet)*

Final Calculation (Tank and Trap):

$$\text{Total VOC (ppmC)} = (C_{Trap} + C_{Tank}) \times 1.086$$

Per method section 4.11, the final concentration includes a 1.086 bias correction factor.

QA/QC Summary

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : **09/19/2012**
Analyst : **DH**
Units : **%**

Instrument ID : **TCD#1**
Calb Date : **04/13/2012**
Reporting Limit : **0.1%**

I - Opening Continuing Calibration Verification - SCAQMD 25.1,25.3

AAC ID	Analyte	O_2	N_2	CO_2	CH_4	CO
CCV	Spike Conc	5.18	14.4	10.3	9.9	10.3
	Result	4.63	14.60	10.08	9.40	9.79
	% Rec *	89.4	101.3	98.4	94.6	94.6

II - Method Blank - SCAQMD 25.1,25.3

AAC ID	Analyte	O_2	N_2	CO_2	CH_4	CO
MB	Concentration	ND	ND	ND	ND	ND

III-Laboratory Control Spike & Duplicate - SCAQMD 25.1,25.3

AAC ID	Analyte	N_2	CO_2	CH_4	CO
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0
	Spike Conc	14.4	10.3	9.9	10.3
	LCS Result	16.2	9.4	9.7	10.1
	LCSD Result	14.6	10.3	9.2	9.7
	LCS % Rec *	112.7	91.7	97.3	97.8
	LCSD % Rec *	101.4	100.2	92.7	93.3
	% RPD ***	10.6	8.8	4.9	4.7

IV-Sample & Sample Duplicate - SCAQMD 25.1,25.3

AAC ID	Analyte	O_2	N_2	CO_2	CH_4	CO
120870-58437	Sample	2.0	41.8	8.5	0.0	0.0
	Sample Dup	1.8	37.1	7.8	0.0	0.0
	Mean	1.9	39.4	8.2	0.0	0.0
	% RPD ***	11.3	11.9	9.6	0.0	0.0

V-Matrix Spike & Duplicate - SCAQMD 25.1,25.3

AAC ID	Analyte	N_2	CO_2	CH_4	CO
120870-58437	Sample Conc	19.7	4.1	0.0	0.0
	Spike Conc	9.2	10.3	9.9	10.3
	MS Result	29.7	13.8	9.3	9.6
	MSD Result	30.9	14.2	9.7	10.8
	MS % Rec **	108.0	94.5	93.2	93.2
	MSD % Rec **	122.0	98.4	97.5	104.5
	% RPD ***	12.2	4.0	4.6	11.4

VI - Closing Continuing Calibration Verification - SCAQMD 25.1,25.3

AAC ID	Analyte	O_2	N_2	CO_2	CH_4	CO
CCV	Spike Conc	5.18	14.4	10.3	9.9	10.3
	Result	4.64	14.4	9.9	9.2	9.5
	% Rec *	89.6	100.1	96.2	92.5	92.0

** Must be 85-115%*
*** Must be 75-125%*
**** Must be < 25%*
ND = Not Detected
<RL = less than Reporting Limit

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Atmospheric Analysis & Consulting, Inc.

SCAQMD Method 25.1,3 Quality Control/Quality Assurance Report

Date Analyzed : 09/20/2012
Analyst : DH

Instrument ID: FID#4
Units: PPMV
Calibration Date: 1/5/2011

I - Opening Calibration Verification Standard

AAC ID	Analyte	Concentration	Result	% Recovery *
O-CV	NMNEOC	54.35	50.23	92.4
O-CV dp	NMNEOC	54.35	52.73	97.0
O-CV tp	NMNEOC	54.35	52.61	96.8

II - Method Blank

AAC ID	Analyte	Result
MB	NMNEOC	ND

III - Matrix Spike & Duplicate

AAC ID	Analyte	Sample Concentration	Spike Added	MS Result	MSD Result	MS % Rec ***	MSD % Rec ***	% RPD****
120870-58437	NMNEOC	0.00	54.35	48.31	48.24	88.9	88.8	0.2

IV - 1 ppm Backflush Standards

AAC ID	Analyte	Result	% Recovery **
Backflush 1	NMNEOC	0.939	86.4
Backflush 2	NMNEOC	0.993	91.4
Backflush 3	NMNEOC	1.012	93.1

V - Bracketed Closing Calibration Verification Standards

AAC ID	Analyte	Concentration	Result	% Recovery *
C-CV Low	NMNEOC	10.9	10.18	93.6
C-CV High	NMNEOC	54.4	51.20	94.2

** Must be 90-110%*
*** Must be 80-120%*
**** Must be 75-125%*
***** Must be < 25%*
****** Must be < 10%*

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Atmospheric Analysis & Consulting, Inc.

SCAQMD Method 25.1,3 Quality Control/Quality Assurance Report

Date Analyzed : 09/20/2012
Analyst: : DH

Instrument ID: FID #4
Units: PPMV
Calibration Date: 1/5/2011

Sample Duplicate analysis RPD's

AAC ID	Result	Result Dup	%RPD
120870-58437	<PQL	<PQL	NA
120870-58438	<PQL	<PQL	NA
120870-58439	38.9	38.3	1.6
120870-58440	37.3	36.3	2.6
120870-58441	38.7	37.3	3.7
120870-58442	38.7	39.6	2.4
120874-58462	8.6	8.5	0.7
120874-58463	4.5	4.5	0.0
120874-58464 x10	202.6	200.7	0.9
120874-58465 x10	369.2	365.1	1.1
120877-58470	1.3	1.3	0.1

Quality Assurance Criteria	
Conc. (ppmv)	%RPD
1-3	≤20
4-6	≤15
7-12	≤12
13-30	≤10
31-50	≤ 5

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

TOC Analysis by SCAQMD Method 25.3

Date Analyzed	: 09/19/2012	Instrument ID	: TOC #1
Analyst	: WH	Units	: µg/mL
PQL	: 0.1 µg/ml	Calibration Date	: 09/18/2012

I - Opening Calibration Verification Standard

Analyte	Std. Conc.	Result	%Recovery*	Qualifier
TOC	2.50	2.55	**102**	NA

II - Method Blank

AAC ID	Analyte	MB	Qualifier
Method Blank	TOC	<PQL	NA

III - Bracketed Quality Control Standards

Analyte	Std. Conc.	Result	%Recovery**	Qualifier
TOC (low)	0.50	0.54	**108**	NA
TOC (High)	5.00	5.02	**100**	NA

IV - Second Source Confirmation

Analyte	Std. Conc.	Result	%Recovery***	Qualifier
TOC	2.50	2.62	**105**	NA

MB must be < PQL

** Must be 98-102%*

***Must be 90-110%*

**** Must be 85-115%*

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Laboratory Director

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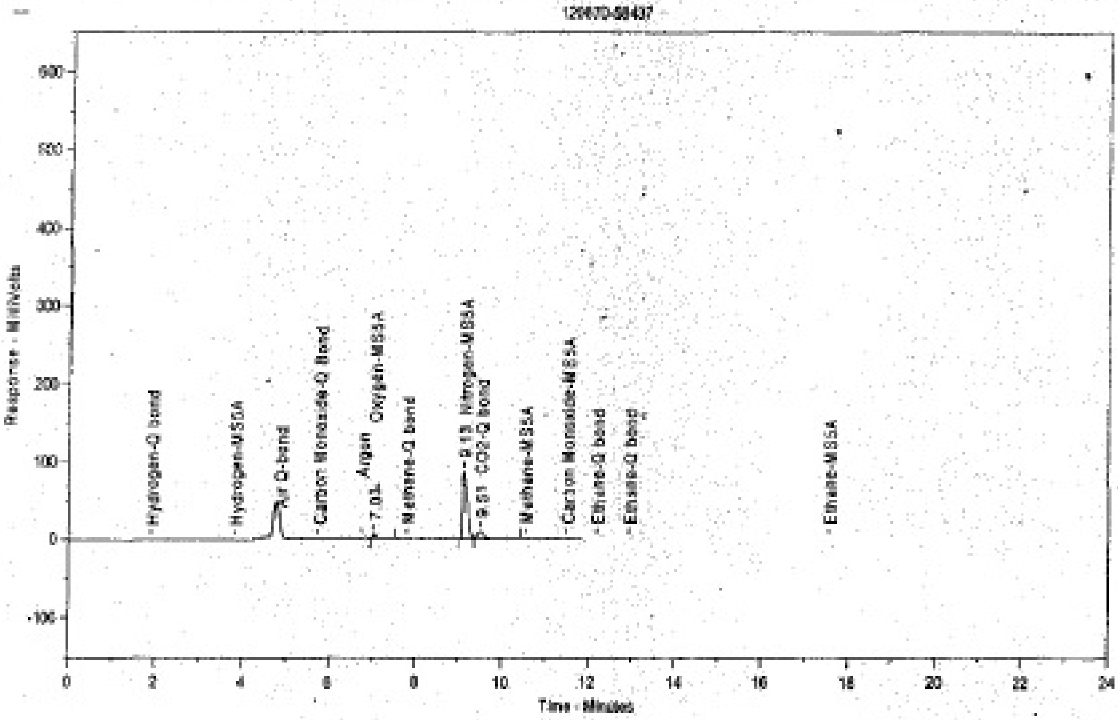
Raw Data



Sample Name = **120870-58437**

Instrument = TCD #1

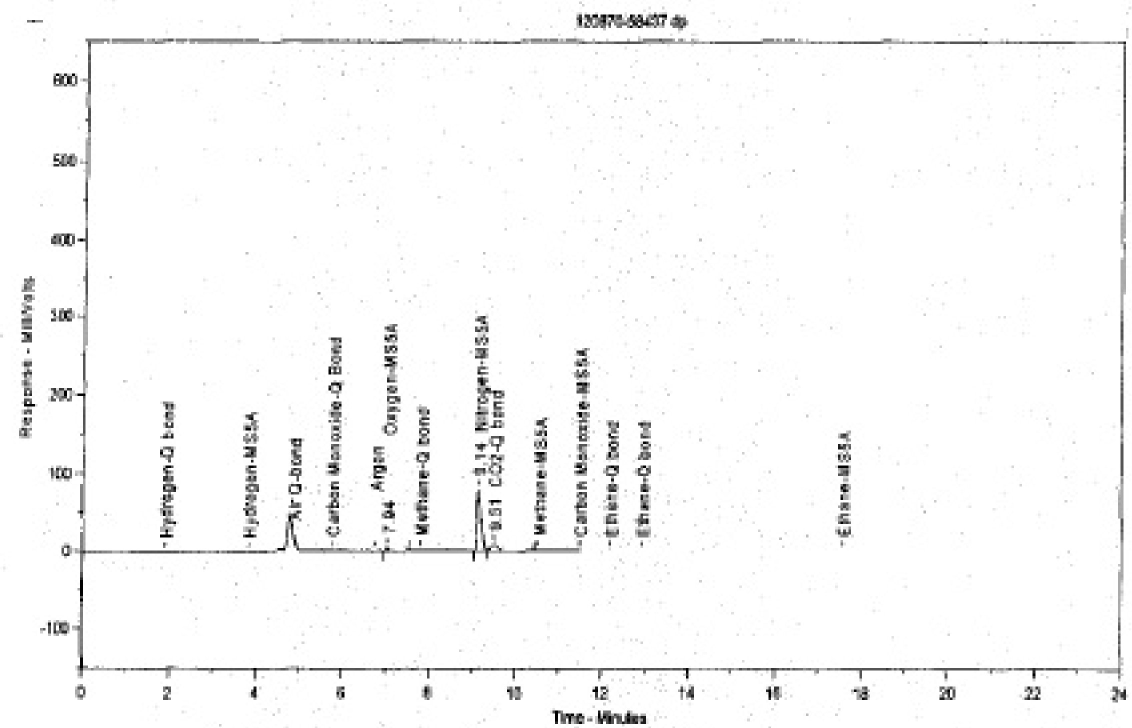
Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0006.raw** Date Taken (end) = 9/19/2012 7:42:32 AM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.031	3.880	27831	3.765	BB	0.08
2	9.13	Nitrogen-MS5A	41.768	79.798	608729	82.357	SBB	0.11
3	9.51	CO2-Q bond	8.543	16.322	102572	13.877	TBB	0.17

Total Area = 739132.5 Total Height = 99519.8 Total Amount = 52.34233

DH 9/19/12

Chrom Perfect Chromatogram Report



Sample Name = **120870-58437 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0007.raw** Date Taken (end) = 9/19/2012 7:57:54 AM
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Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.04	Oxygen-MS5A	1.814	3.888	24851	3.775	BB	0.08
2	9.14	Nitrogen-MS5A	37.074	79.476	540316	82.072	SBB	0.11
3	9.51	CO2-Q bond	7.761	16.637	93176	14.153	TBB	0.17

Total Area = 658342.8 Total Height = 91457.75 Total Amount = 46.64805

Printed on 9/19/2012 7:58:20 AM

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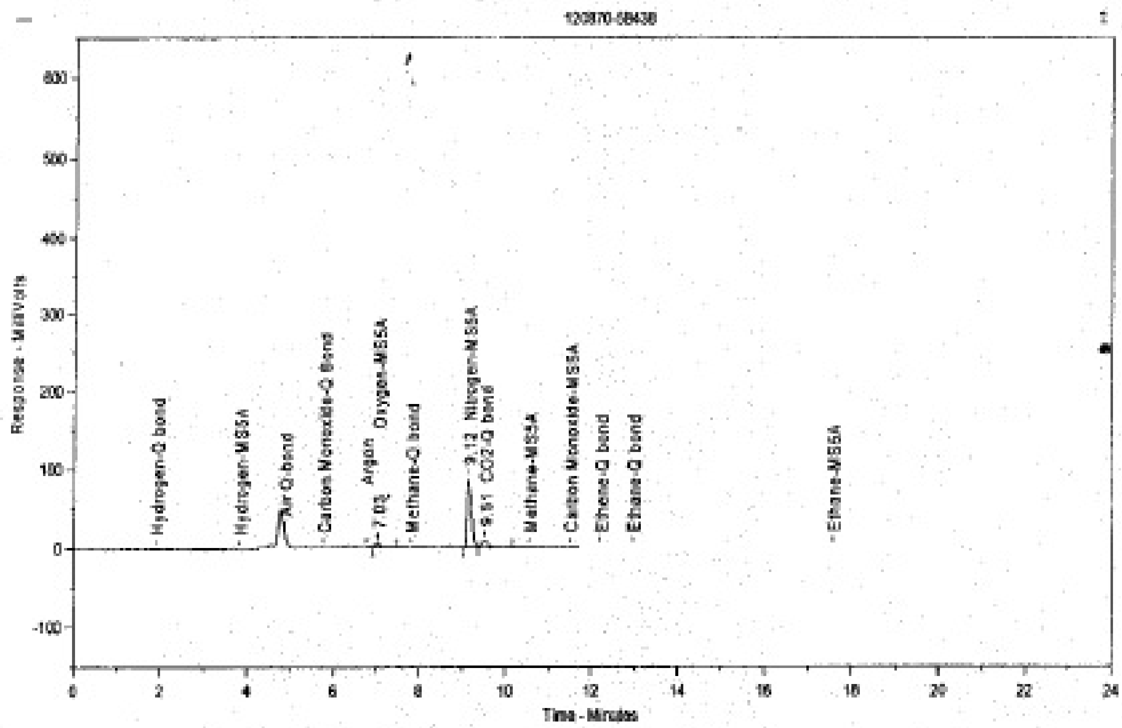
DH 9/19/12



Sample Name = **120870-58438**

Instrument = TCD #1

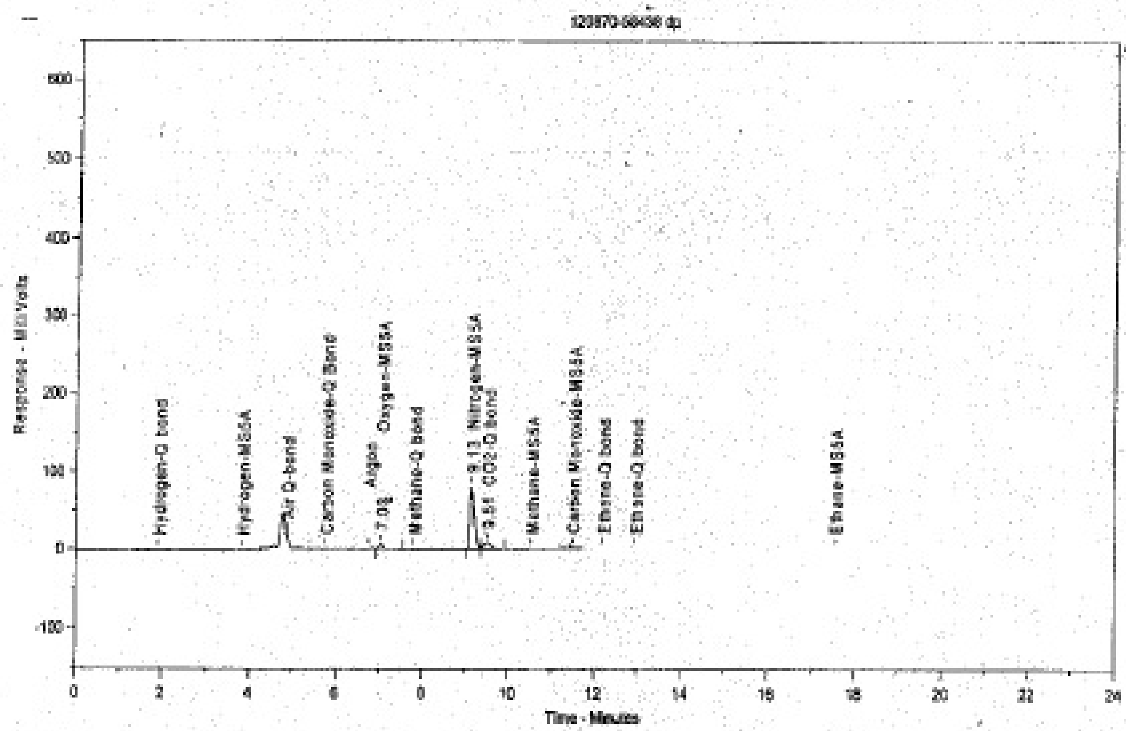
Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0016.raw** Date Taken (end) = 9/19/2012 10:18:46 AM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.442	4.617	33456	4.473	BB	0.08
2	9.12	Nitrogen-MS5A	42.433	80.250	618421	82.683	SBB	0.11
3	9.51	CO2-Q bond	8.002	15.133	96069	12.844	TBB	0.17

Total Area = 747945.4 Total Height = 100769.2 Total Amount = 52.87614

DH 9/19/12

Chrom Perfect Chromatogram Report



Sample Name = **120870-58438 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0017.raw** Date Taken (end) = 9/19/2012 10:34:14 AM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.199	4.678	30133	4.530	BB	0.08
2	9.13	Nitrogen-MS5A	37.799	80.406	550892	82.814	BV	0.11
3	9.51	CO2-Q bond	7.012	14.916	84190	12.656	VB	0.17

Total Area = 665215.1 Total Height = 92806.27 Total Amount = 47.01077

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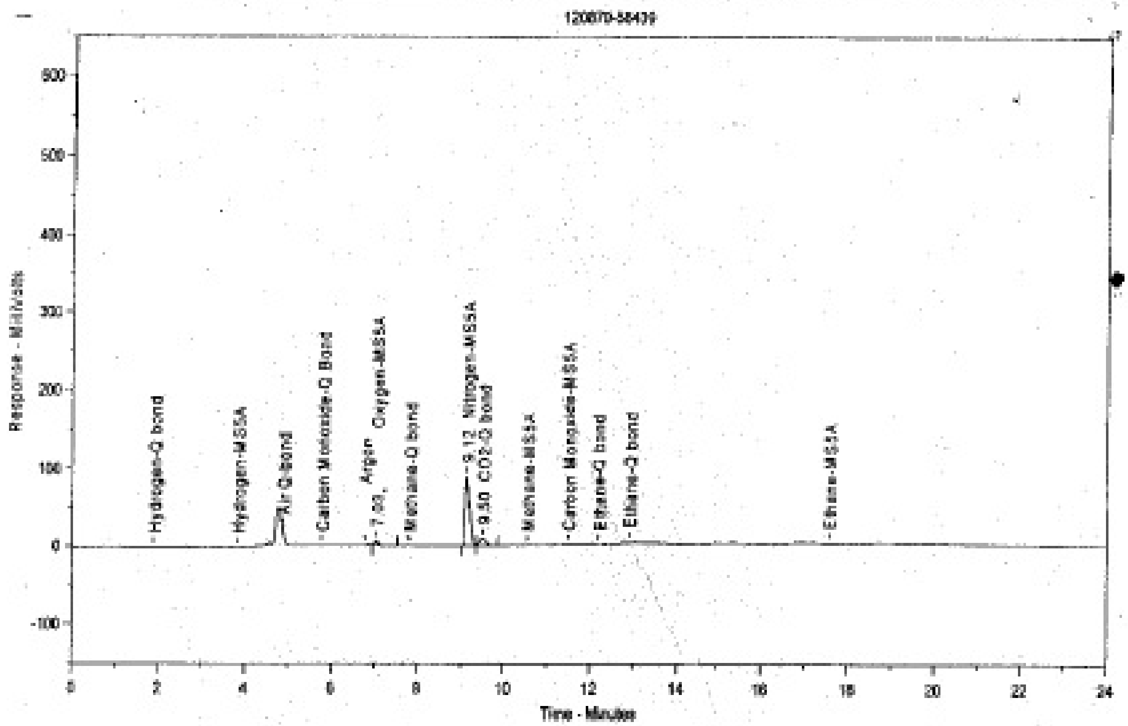

Sample Name = **120870-58439**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0018.raw** Date Taken (end) = 9/19/2012 11:02:10 AM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.570	4.685	35219	4.538	BB	0.08
2	9.12	Nitrogen-MS5A	43.992	80.185	641136	82.619	BV	0.12
3	9.50	CO2-Q bond	8.301	15.131	99665	12.843	VB	0.17

Total Area = 776019 Total Height = 103739.1 Total Amount = 54.86287

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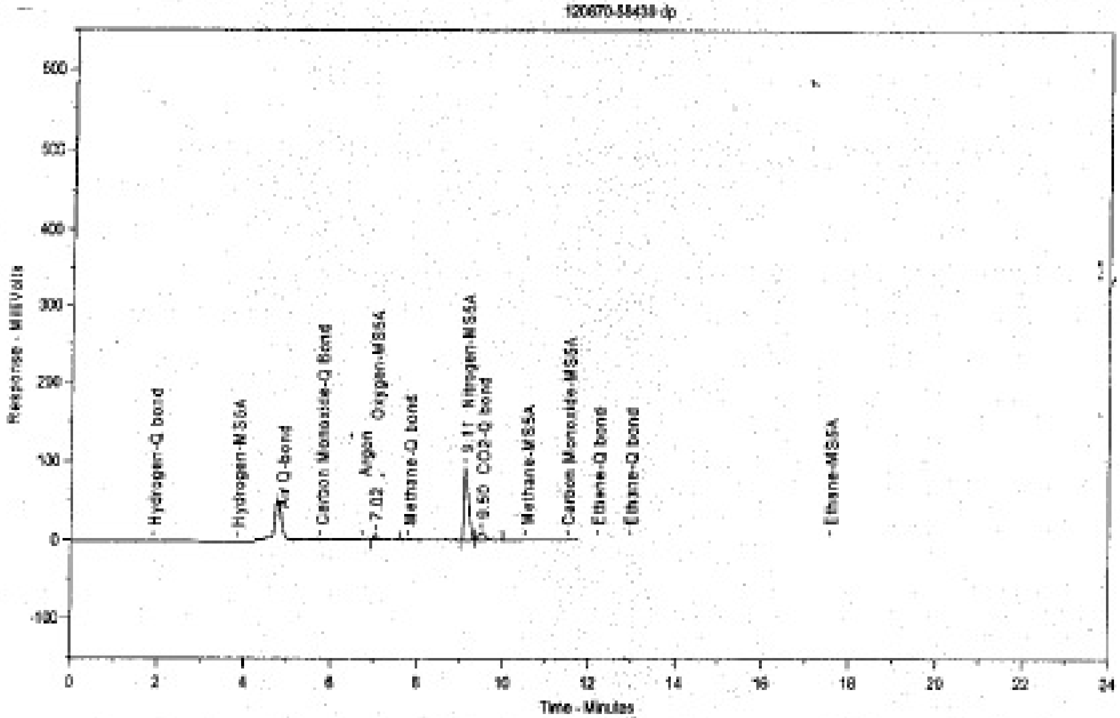

Sample Name = **120870-58439 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0019.raw** Date Taken (end) = 9/19/2012 11:46:16 AM

Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1

Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.02	Oxygen-MS5A	2.679	4.640	36711	4.497	BB	0.09
2	9.11	Nitrogen-MS5A	46.149	79.921	672579	82.391	BV	0.12
3	9.50	CO2-Q bond	8.915	15.440	107039	13.112	VB	0.17

Total Area = 816328 Total Height = 107055.6 Total Amount = 57.74339

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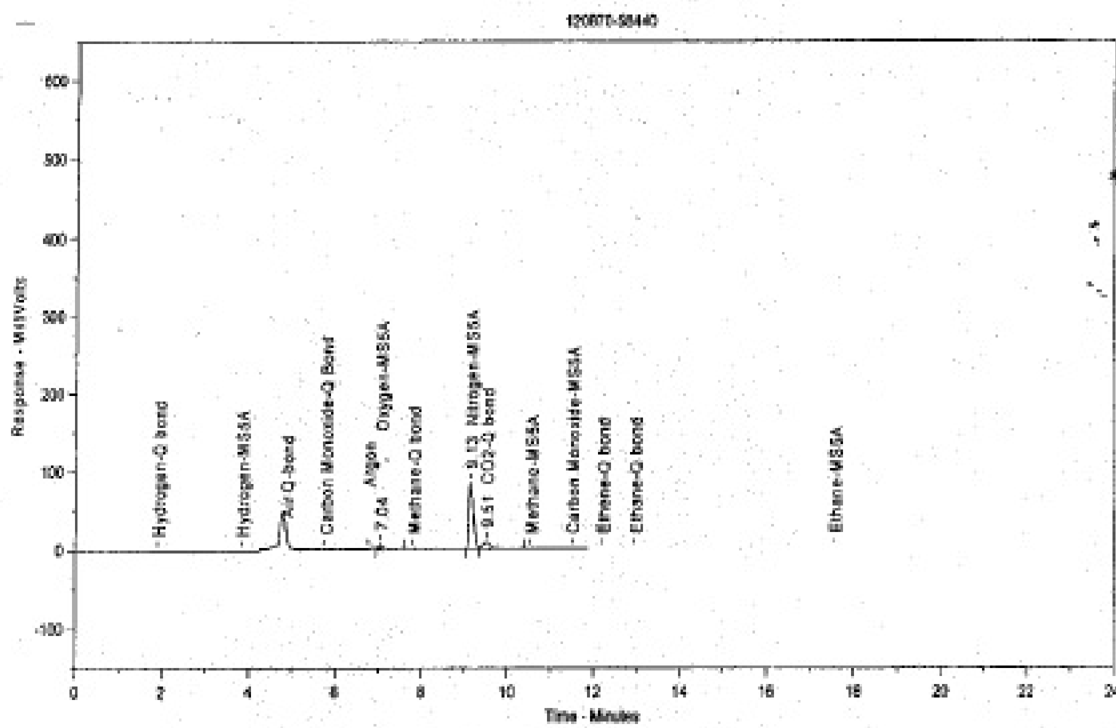

Sample Name = **120870-68440**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0020.raw** Date Taken (end) = 9/19/2012 12:01:59 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.04	Oxygen-MS5A	2.240	4.418	30693	4.285	BB	0.08
2	9.13	Nitrogen-MS5A	40.437	79.767	589333	82.277	SBB	0.11
3	9.51	CO2-Q bond	8.017	15.815	96255	13.438	TBB	0.17

Total Area = 716281.6 Total Height = 97413.19 Total Amount = 50.6942

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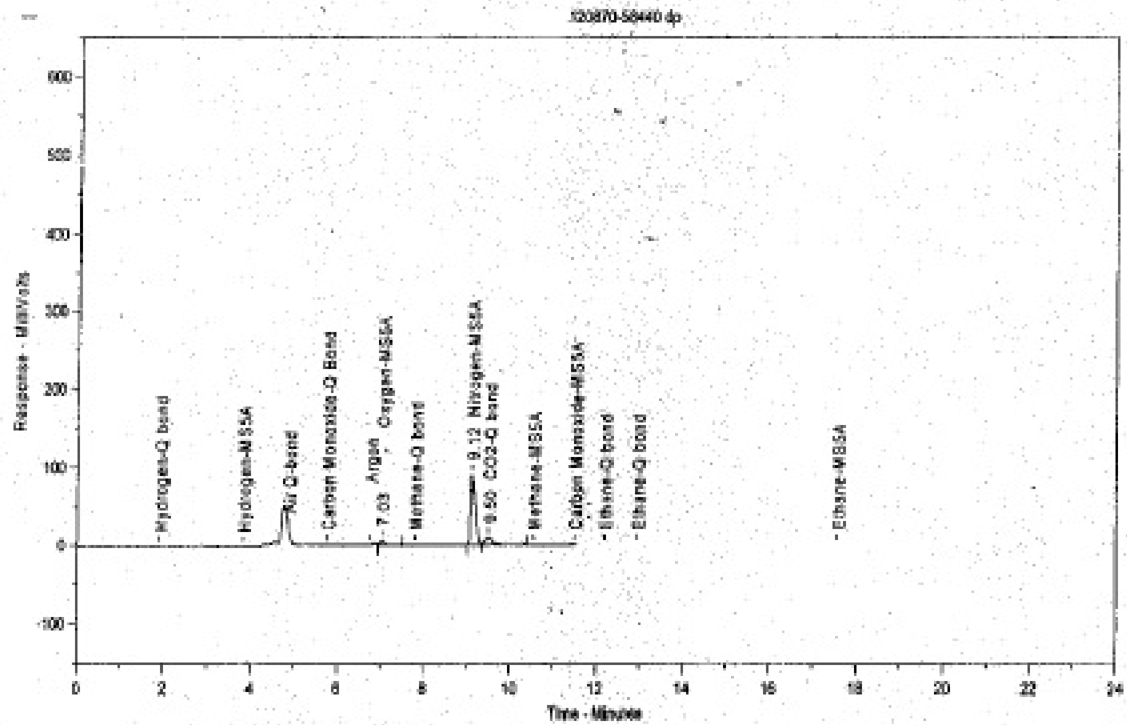
Chrom Perfect Chromatogram Report



Sample Name = **120870-58440 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0021.raw** Date Taken (end) = 9/19/2012 12:17:49 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.471	4.373	33861	4.241	BB	0.08
2	9.12	Nitrogen-MS5A	45.101	79.821	657300	82.329	SBB	0.12
3	9.50	CO2-Q bond	8.931	15.806	107223	13.430	TBB	0.17

Total Area = 798383.4 Total Height = 105296.8 Total Amount = 56.5024

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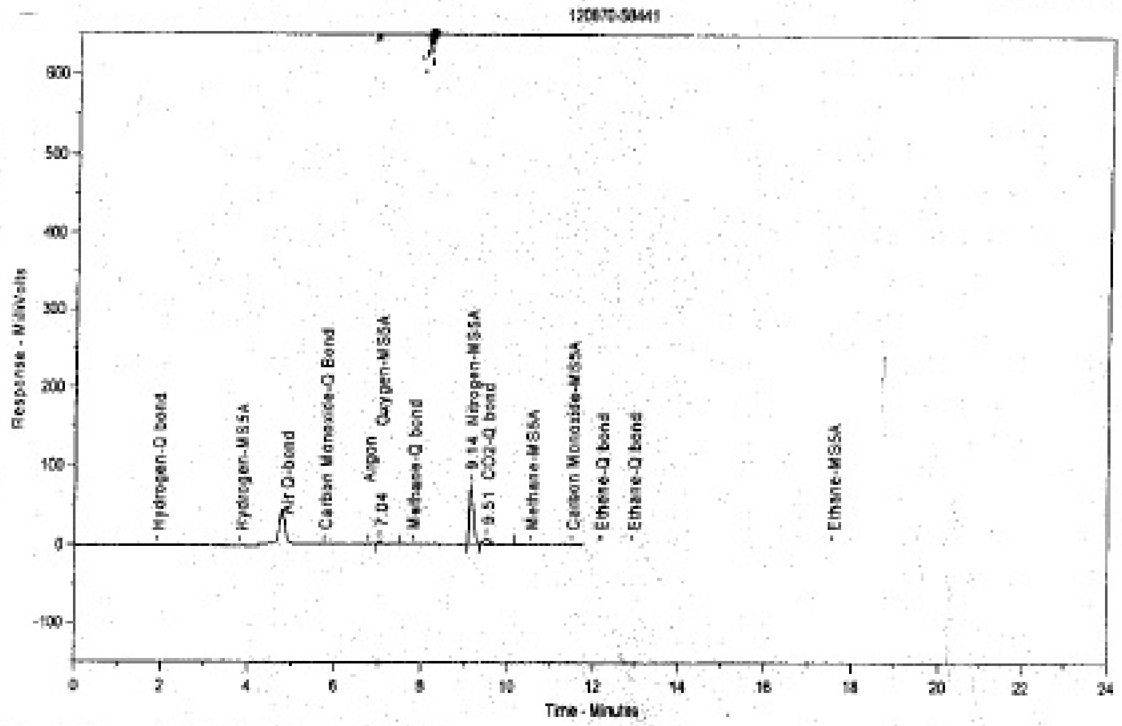
Chrom Perfect Chromatogram Report



Sample Name = **120870-58441**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0022.raw** Date Taken (end) = 9/19/2012 12:33:27 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.04	Oxygen-MS5A	1.986	4.501	27207	4.366	BB	0.08
2	9.14	Nitrogen-MS5A	35.088	79.538	511380	82.067	SBB	0.11
3	9.51	CO2-Q bond	7.041	15.961	84540	13.567	TBB	0.17

Total Area = 623126.9 Total Height = 88296.23 Total Amount = 44.11524

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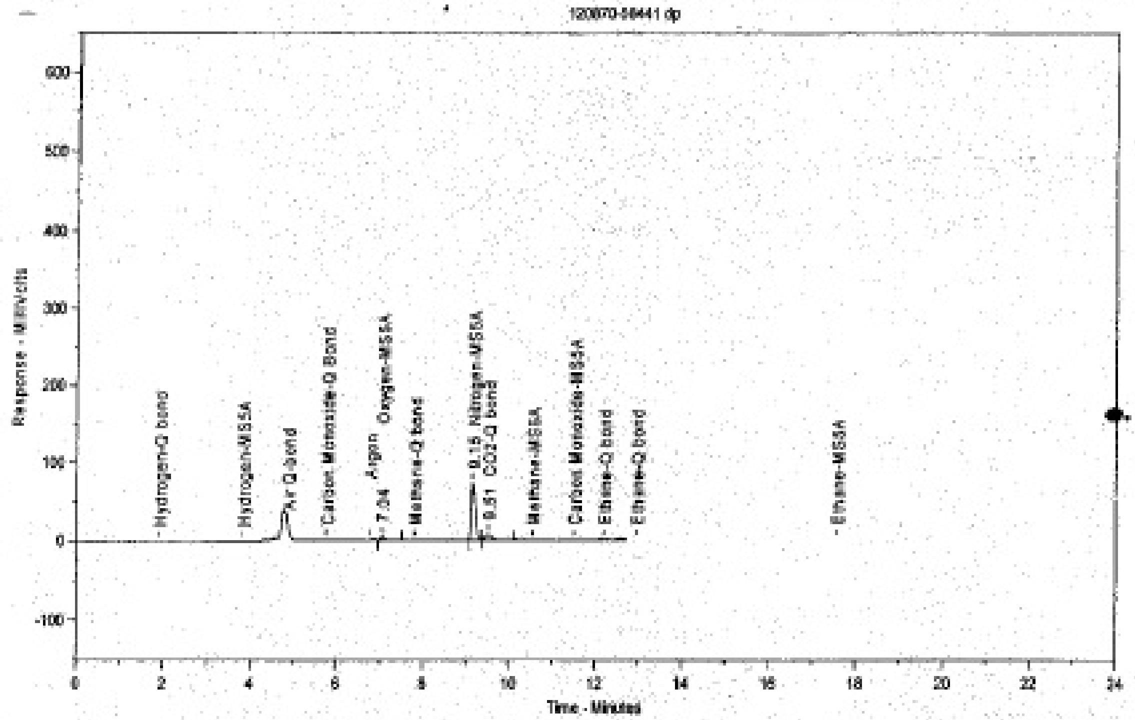

Sample Name = **120870-58441 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0023.raw** Date Taken (end) = 9/19/2012 12:50:04 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.04	Oxygen-MS5A	1.857	4.505	25452	4.371	BB	0.08
2	9.15	Nitrogen-MS5A	32.749	79.425	477289	81.966	BV	0.10
3	9.51	CO2-Q bond	6.626	16.071	79559	13.663	VB	0.17

Total Area = 582299.3 Total Height = 63999.31 Total Amount = 41.2331

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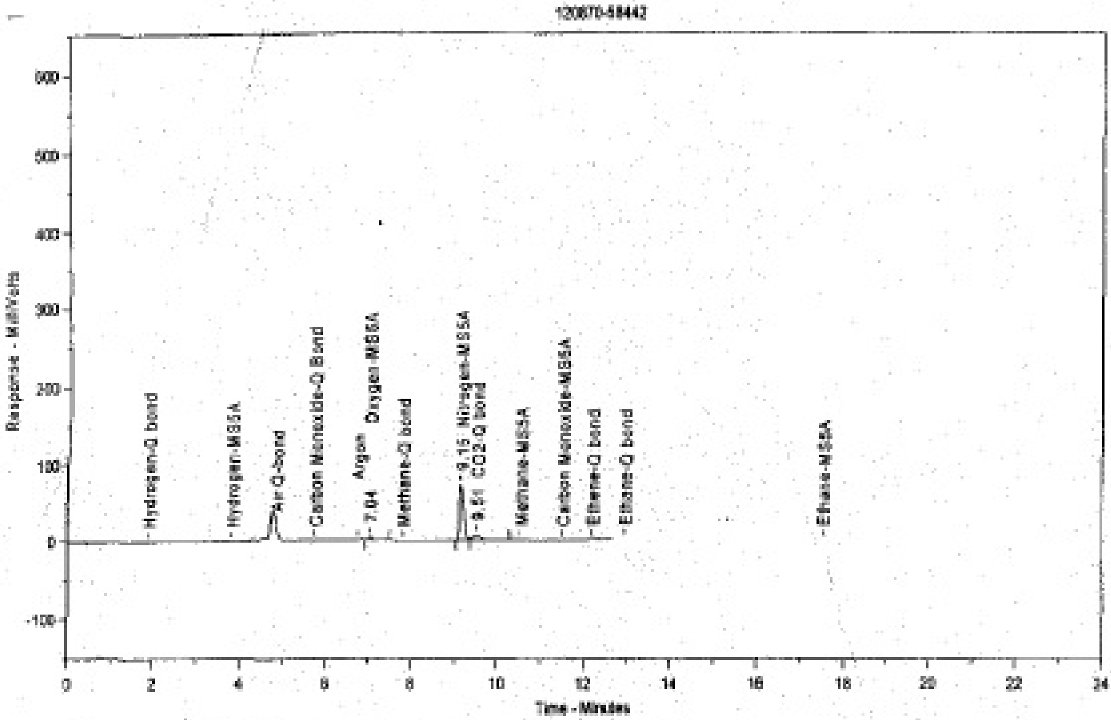

Sample Name = **120870-58442**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0024.raw** Date Taken (end) = 9/19/2012 1:06:32 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = **1**
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.04	Oxygen-MS5A	1.818	4.427	24905	4.298	BB	0.08
2	9.15	Nitrogen-MS5A	32.517	79.208	473902	81.782	SBB	0.10
3	9.51	CO2-Q bond	6.718	16.365	80659	13.920	TBB	0.17

Total Area = 579466.6 Total Height = 83524.01 Total Amount = 41.0525

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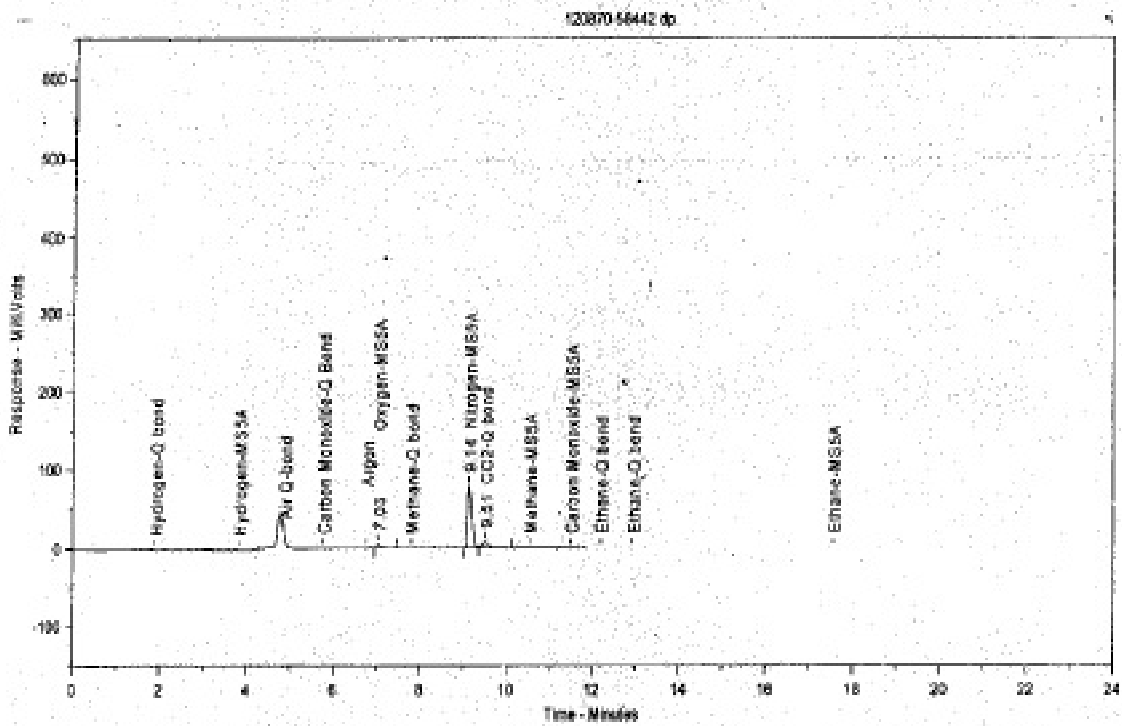

Sample Name = **120870-58442 dp**

Instrument = TCD #1

Raw File Name = **C:\CPDATA\Inst#01\2012\091912.0025.raw** Date Taken (end) = 9/19/2012 1:22:56 PM
Method File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C.MET Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #01\2012\D1945-D1946-3C-041312-standard.CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	7.03	Oxygen-MS5A	2.012	4.396	27576	4.264	BB	0.08
2	9.14	Nitrogen-MS5A	36.441	79.597	531096	82.130	SBB	0.11
3	9.51	CO2-Q bond	7.328	16.007	87983	13.606	TBB	0.17

Total Area = 646655.2 Total Height = 90498.25 Total Amount = 45.78179

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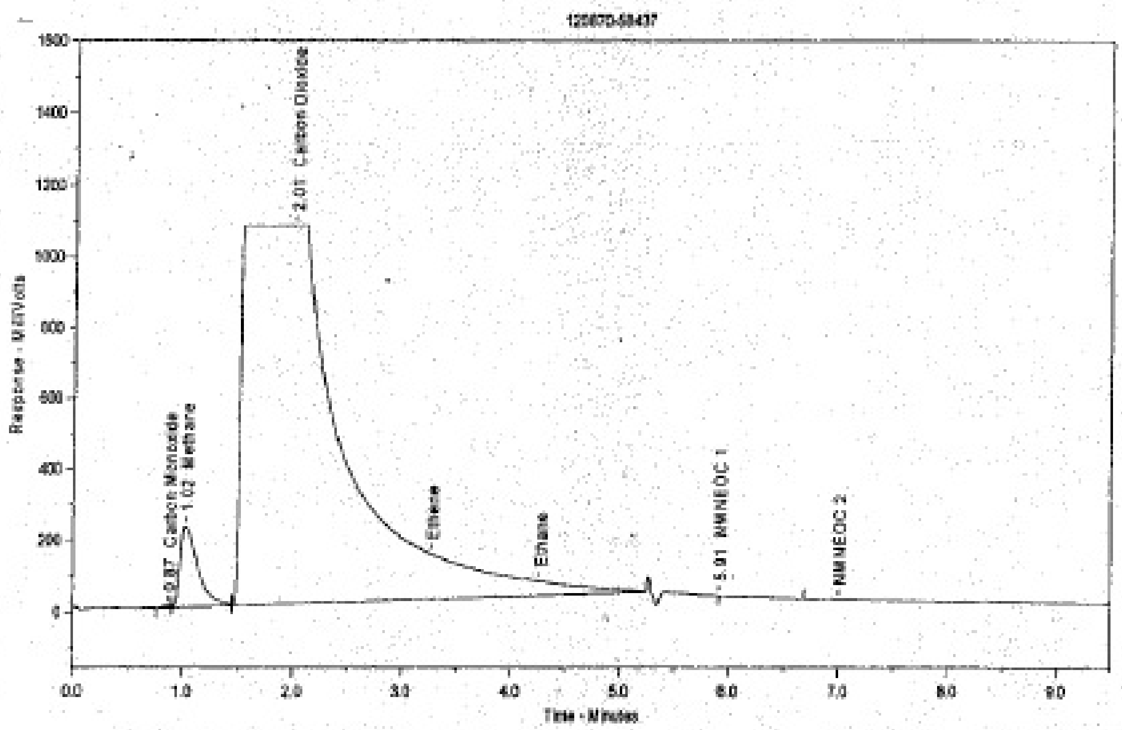

Sample Name = **120870-68437**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0008.raw**
Date Taken (end) = 9/20/2012 7:48:53 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met
Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.87	Carbon Monoxide	1.461	0.043	26534	0.037	BV	0.09
2	1.02	Methane	124.715	3.660	2510531	3.523	VV	0.16
3	2.01	Carbon Dioxide	3281.455	96.294	68708768	96.431	VB	0.84
4	5.91	NMNEOC 1	0.119	0.003	5964	0.008	BB	0.39

Total Area = 7.125179E+07
Total Height = 1291747
Total Amount = 3407.751

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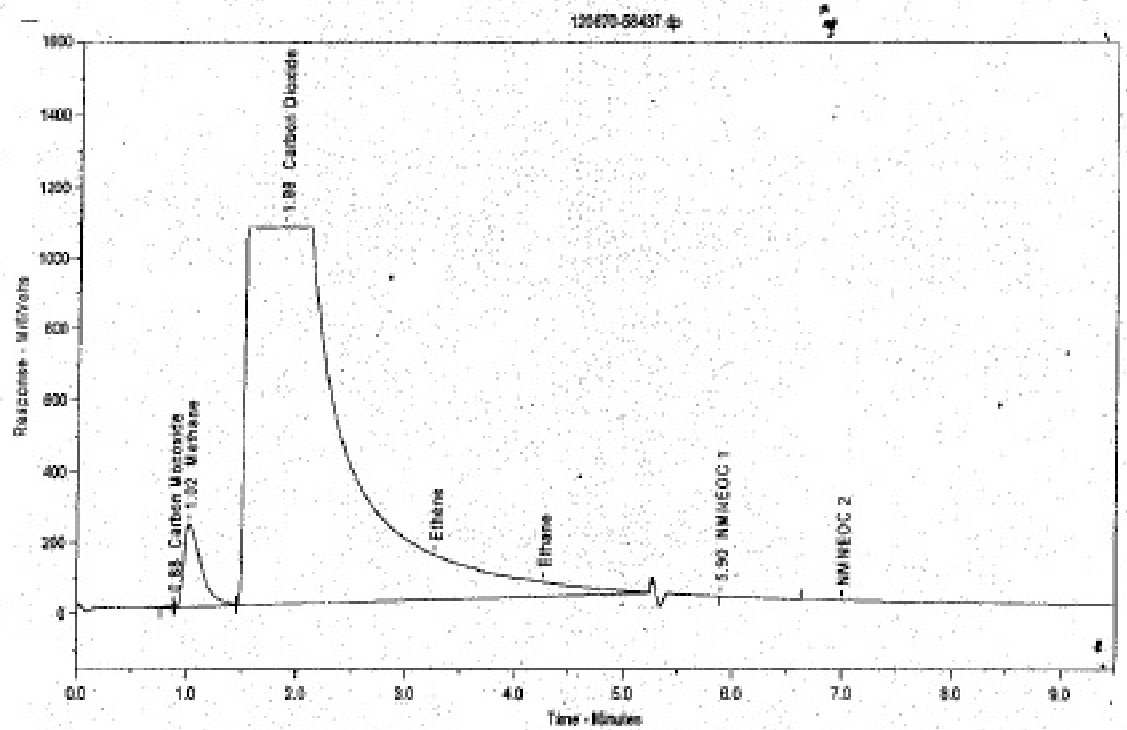

Sample Name = **120670-58437 dp**

Instrument = FID #4

Raw File Name = C:\CPDATA\Inst#04\2012\092012.0009.raw Date Taken (end) = 9/20/2012 8:02:17 AM

Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1

Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.88	Carbon Monoxide	0.961	0.028	17448	0.025	BV	0.08
2	1.02	Methane	125.189	3.694	2520083	3.556	VV	0.16
3	1.88	Carbon Dioxide	3262.773	96.275	68317600	96.412	VB	0.83
4	5.90	NMNEOC 1	0.094	0.003	4736	0.007	BB	0.37

Total Area = 7.085985E+07 Total Height = 1296492 Total Amount = 3389.018

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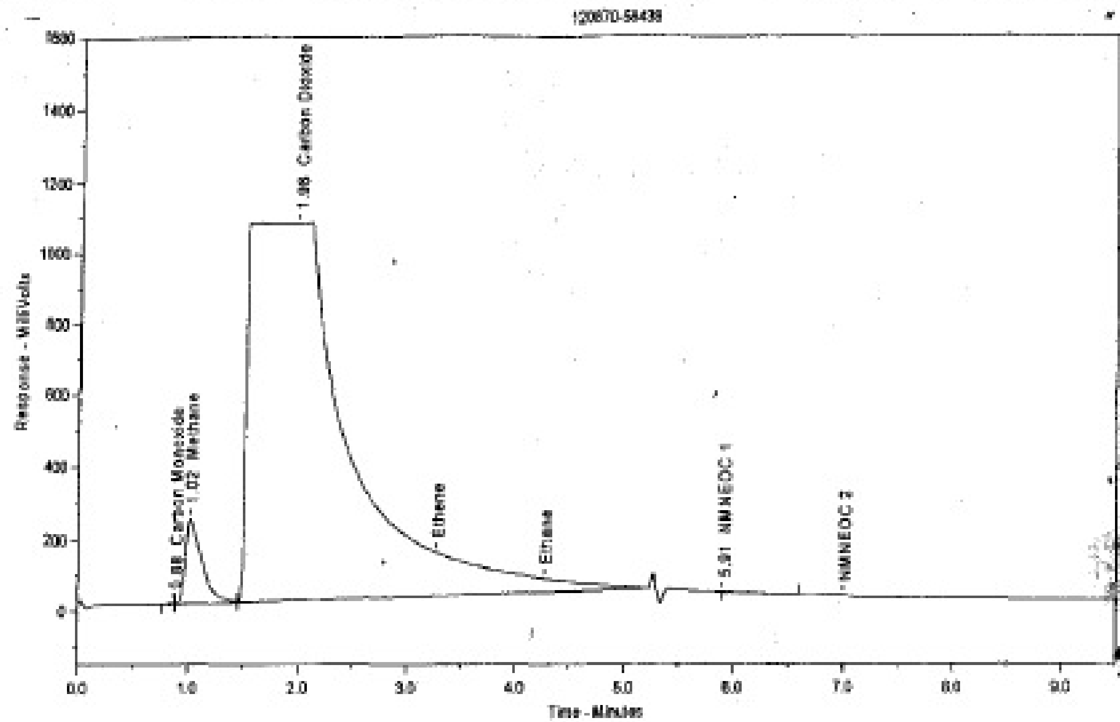
Chrom Perfect Chromatogram Report



Sample Name = **120870-58438**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0012.raw** Date Taken (end) = 9/20/2012 8:43:04 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.88	Carbon Monoxide	0.697	0.021	12661	0.018	BV	0.06
2	1.02	Methane	120.975	3.615	2435230	3.481	VV	0.15
3	1.98	Carbon Dioxide	3224.411	96.361	67514352	96.494	VB	0.82
4	5.91	NMNEOC 1	0.096	0.003	4831	0.007	BB	0.34

Total Area = 6.996707E+07 Total Height = 1295294 Total Amount = 3346.179

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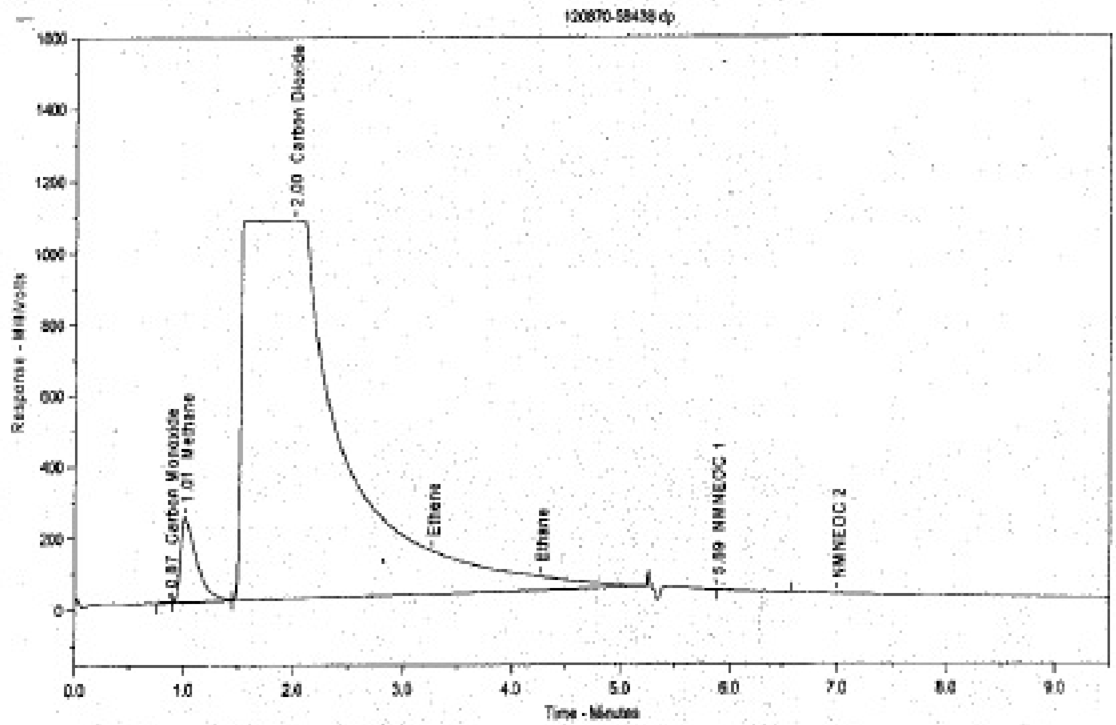

Sample Name = **120870-58438 dp**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0013.raw** Date Taken (end) = 9/20/2012 8:56:24 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.87	Carbon Monoxide	0.857	0.026	15573	0.022	BV	0.10
2	1.01	Methane	119.807	3.598	2411720	3.464	VV	0.15
3	2.00	Carbon Dioxide	3209.320	96.373	67198360	96.506	VB	0.82
4	5.89	NMNEOC 1	0.118	0.004	5907	0.008	BB	0.35

Total Area = 6.963156E+07 Total Height = 1295786 Total Amount = 3330.102

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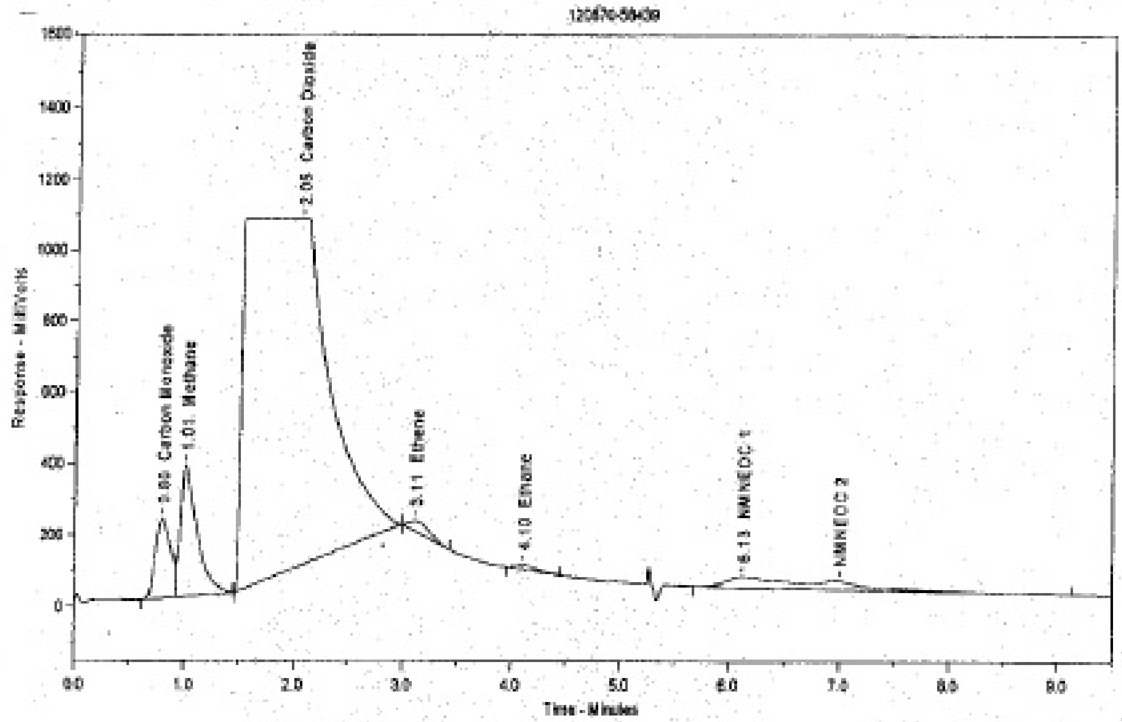
Chrom Perfect Chromatogram Report



Sample Name = **120870-58439**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.8014.raw** Date Taken (end) = 9/20/2012 9:09:48 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	117.362	4.131	2131457	3.530	BV	0.18
2	1.01	Methane	191.139	6.728	3847654	6.371	VB	0.15
3	2.05	Carbon Dioxide	2478.250	87.233	51890848	85.927	BB	0.86
4	3.11	Ethene	10.767	0.379	408737	0.677	BB	0.29
5	4.10	Ethane	4.526	0.159	160783	0.266	BB	0.31
6	6.13	NMNEOC 1	38.906	1.369	1949801	3.229	BB	1.31

Total Area = 6.038928E+07 Total Height = 1633445 Total Amount = 2840.951

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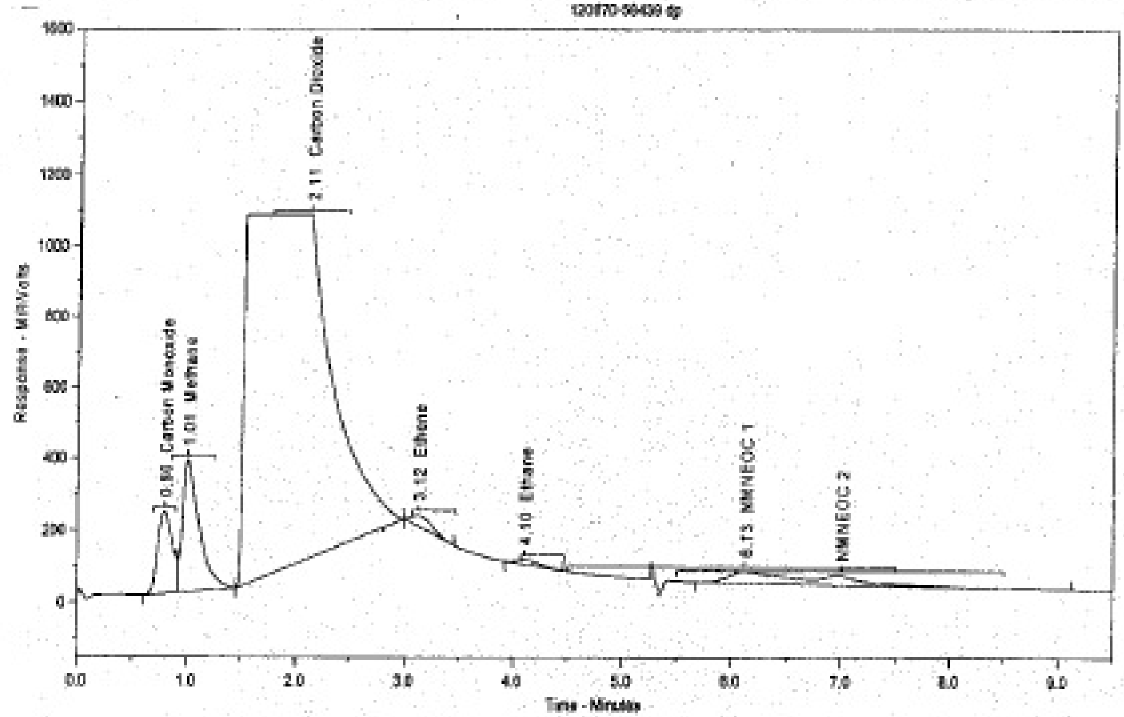

Sample Name = **120870-59439 dp**

Instrument = FID #4

Raw File Name = **C:\CPDATA\inst#04\2012\092012.0015.raw** Date Taken (end) = 9/20/2012 9:23:06 AM
Method File Name = C:\Cpmethods\inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\inst #04\2011\M25.1,3-010611.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	118.242	4.164	2147430	3.559	BV	0.17
2	1.01	Methane	190.373	6.705	3832231	6.351	VB	0.15
3	2.11	Carbon Dioxide	2476.639	87.228	51857128	85.941	BB	0.85
4	3.12	Ethene	10.609	0.374	402743	0.667	BB	0.29
5	4.10	Ethane	5.130	0.181	182187	0.302	BB	0.35
6	6.13	NMNEOC 1	38.289	1.349	1918918	3.180	BB	1.29

Total Area = 6.034064E+07 Total Height = 1627408 Total Amount = 2839.282

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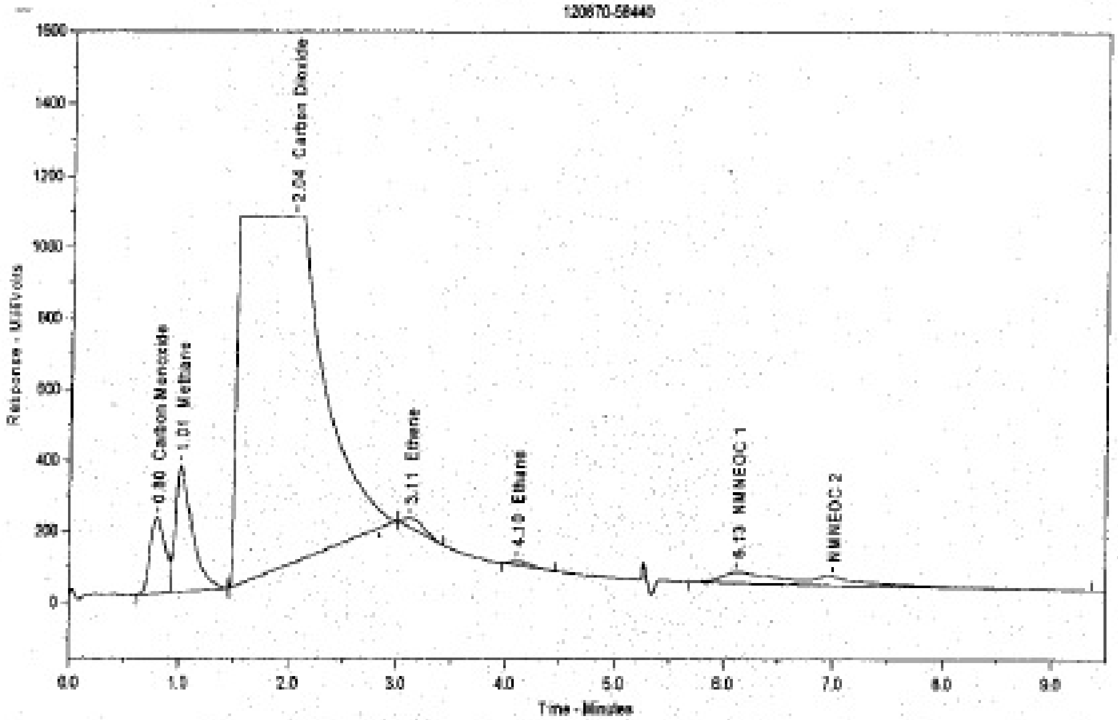

Sample Name = **120870-58440**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0016.raw** Date Taken (end) = 9/20/2012 9:36:25 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	111.531	3.946	2025554	3.374	BV	0.17
2	1.01	Methane	185.873	6.576	3741535	6.232	VB	0.15
3	2.04	Carbon Dioxide	2478.285	87.677	51891580	86.436	BB	0.85
4	3.11	Ethene	9.335	0.330	354388	0.590	BB	0.27
5	4.10	Ethane	4.300	0.152	152693	0.254	BB	0.31
6	6.13	NMNEOC 1	37.291	1.319	1868879	3.113	BB	1.33

Total Area = 6.003473E+07 Total Height = 1610020 Total Amount = 2826.614

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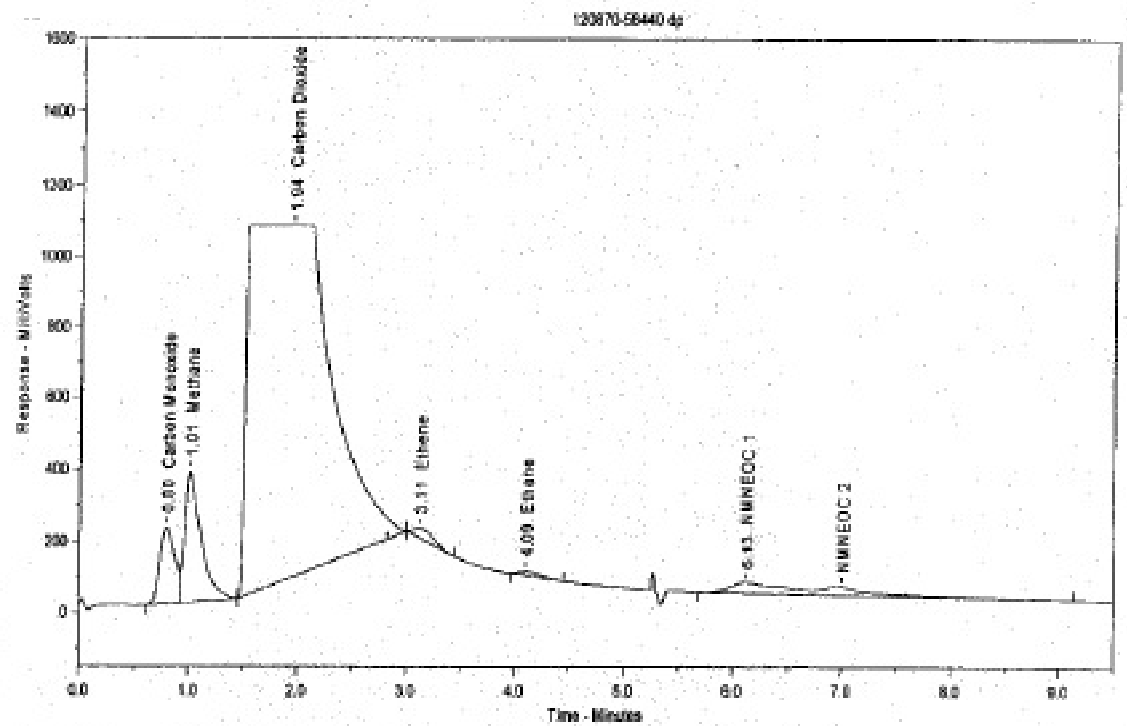

Sample Name = **120870-58440 dp**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0017.raw** Date Taken (end) = 9/20/2012 9:49:41 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	111.490	3.950	2024820	3.379	BV	0.17
2	1.01	Methane	186.204	6.598	3748307	6.256	VB	0.15
3	1.94	Carbon Dioxide	2474.306	87.673	51808272	86.466	BB	0.84
4	3.11	Ethene	9.520	0.337	361429	0.603	BB	0.28
5	4.09	Ethane	4.336	0.154	153971	0.257	BB	0.30
6	6.13	NMNEOC 1	36.336	1.288	1821036	3.039	BB	1.30

Total Area = 5.991784E+07 **Total Height = 1629357** Total Amount = 2822.193

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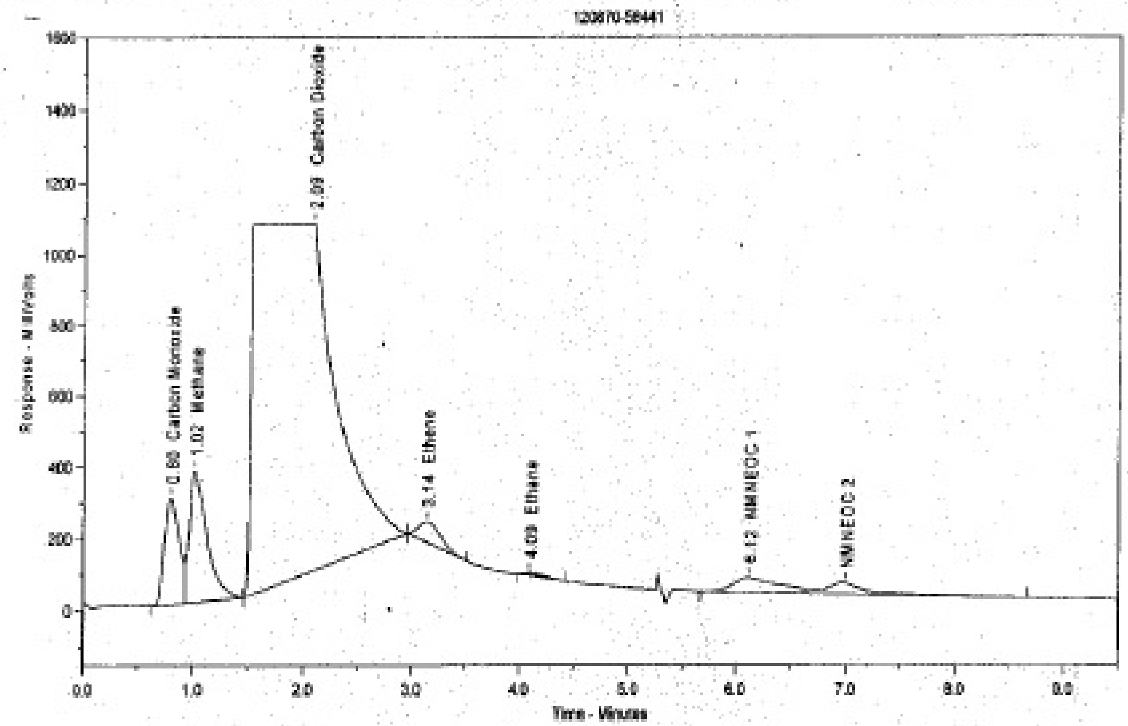

Sample Name = **120870-58441**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0020.raw**
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Date Taken (end) = 9/20/2012 10:26:52 AM
Dilution Factor = 1

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	150.732	5.391	2737498	4.601	BV	0.16
2	1.02	Methane	200.054	7.155	4027114	6.768	VB	0.16
3	2.09	Carbon Dioxide	2382.150	85.200	49878664	83.830	BB	0.80
4	3.14	Ethene	21.607	0.773	820279	1.379	BB	0.34
5	4.09	Ethane	2.693	0.096	95618	0.161	BB	0.27
6	6.12	NMNEOC 1	38.717	1.385	1940342	3.261	BB	1.19

Total Area = 5.949952E+07 Total Height = 1739933 Total Amount = 2795.953

Printed on 9/20/2012 10:27:20 AM

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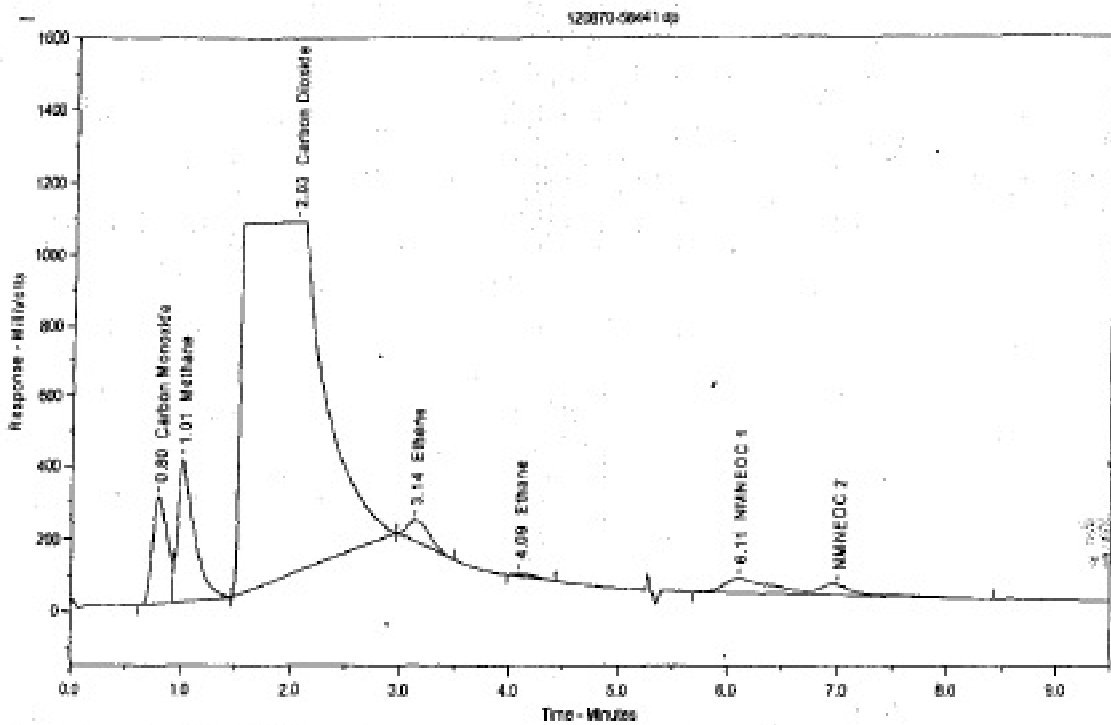
DH 9/20/12



Sample Name = **120870-58441 dp**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0021.raw**
Date Taken (end) = 9/20/2012 10:40:16 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met
Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	150.461	5.397	2732574	4.609	BV	0.16
2	1.01	Methane	202.624	7.268	4078840	6.879	VB	0.15
3	2.03	Carbon Dioxide	2373.358	85.126	49694564	83.814	BB	0.80
4	3.14	Ethene	21.433	0.769	813669	1.372	BB	0.33
5	4.09	Ethane	2.859	0.103	101540	0.171	BB	0.28
6	6.11	NMNEOC 1	37.316	1.338	1870125	3.154	BB	1.17

Total Area = 5.929131E+07 Total Height = 1769607 Total Amount = 2788.051

Printed on 9/20/2012 10:40:55 AM

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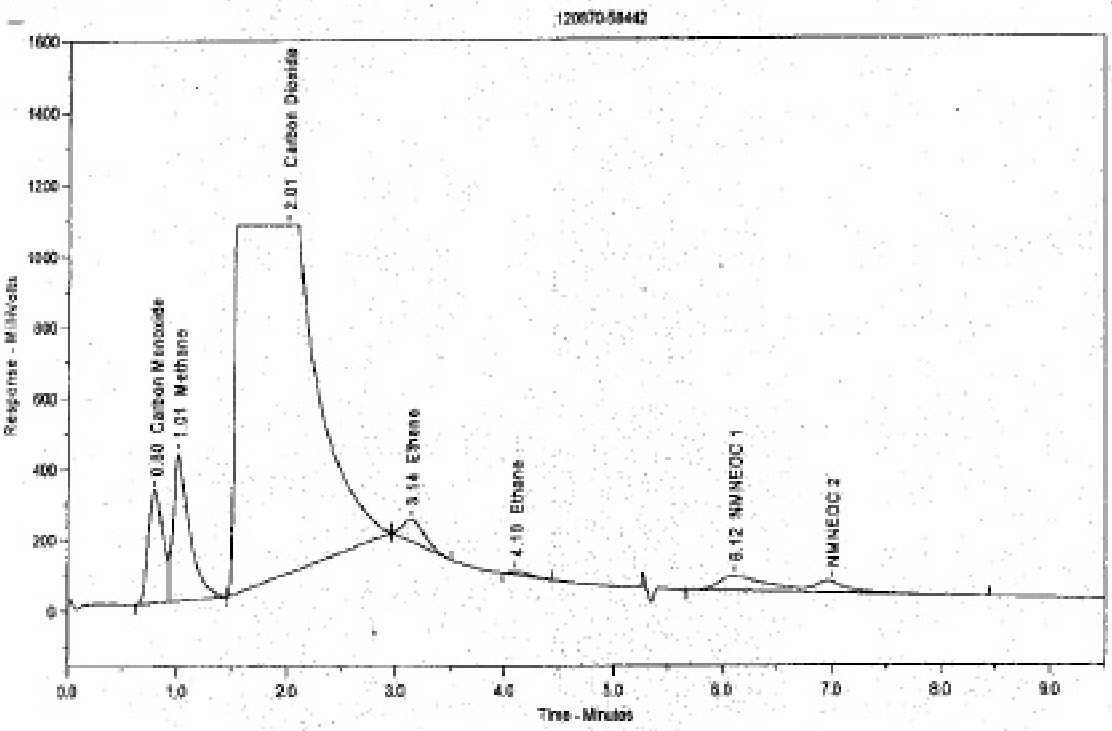
KU 9/20/12

Chrom Perfect Chromatogram Report



Sample Name = **120870-58442**

Instrument = FID #4

Raw File Name = C:\CPDATA\Inst#04\2012\092012.0022.raw — Date Taken (end) = 9/20/2012 10:53:33 AM
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met — Dilution Factor = 1
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010511.CAL(2).CAL

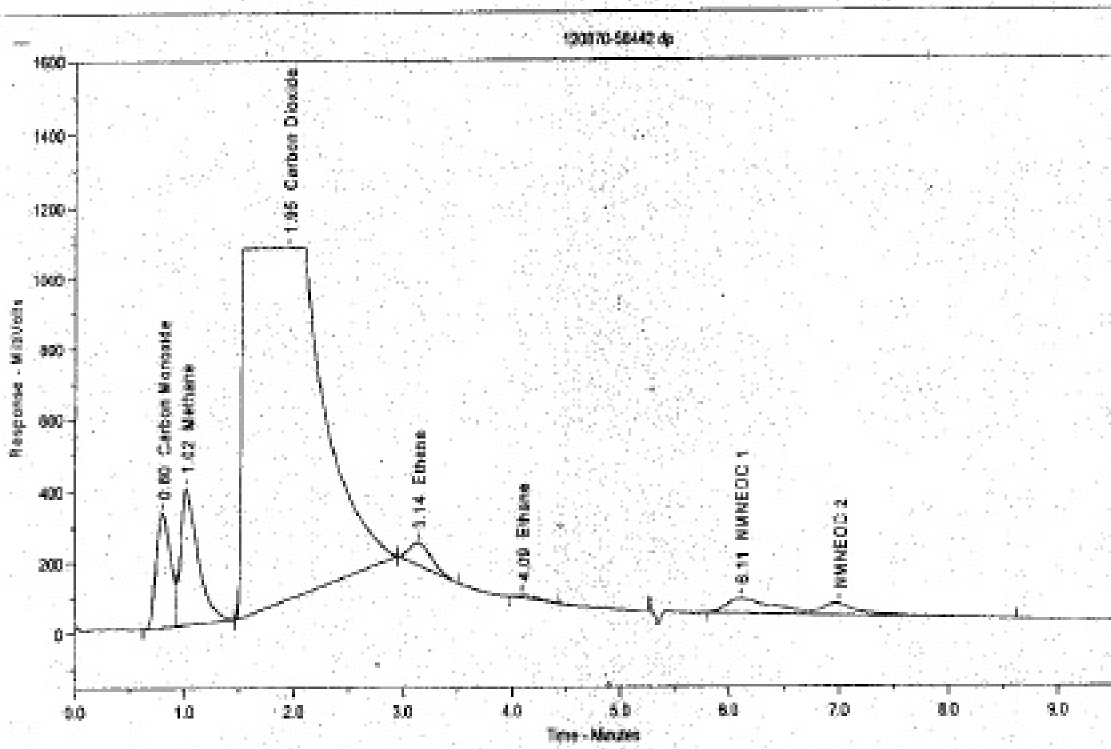
Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	161.968	5.759	2941557	4.917	BV	0.16
2	1.01	Methane	211.815	7.532	4263853	7.127	VB	0.14
3	2.01	Carbon Dioxide	2373.728	84.406	49702324	83.074	BB	0.80
4	3.14	Ethene	22.977	0.817	872296	1.458	BB	0.34
5	4.10	Ethane	3.136	0.111	111326	0.186	BB	0.29
6	6.12	NMNEOC 1	38.666	1.375	1937815	3.239	BB	1.17

Total Area = 5.982918E+07 — Total Height = 1826957 — Total Amount = 2812.29

Printed on 9/20/2012 11:53:00 AM

DH 9/20/12

Chrom Perfect Chromatogram Report



Sample Name = **120870-58442 dp**

Instrument = FID #4

Raw File Name = **C:\CPDATA\Inst#04\2012\092012.0023.raw**
Method File Name = C:\Cpmethods\Inst #04\2012\Method25.1,3.met
Calibration File Name = C:\Cpmethods\Inst #04\2011\M25.1,3-010611.CAL(2).CAL

Date Taken (end) = 9/20/2012 11:25:11 AM
Dilution Factor = 1

Peak #	Ret. Time	Name	Amount	Amt %	Area	Area %	Type	Width
1	0.80	Carbon Monoxide	163.773	5.788	2974349	4.939	BV	0.16
2	1.02	Methane	211.124	7.462	4249950	7.057	VB	0.16
3	1.95	Carbon Dioxide	2388.181	84.404	50004936	83.033	BB	0.80
4	3.14	Ethene	23.567	0.833	894689	1.486	BB	0.34
5	4.09	Ethane	3.190	0.113	113293	0.188	BB	0.29
6	6.11	NMNEOC 1	39.619	1.400	1985581	3.297	BB	1.19

Total Area = 6.02228E+07 Total Height = 1806464 Total Amount = 2829.455

Printed on 9/20/2012 11:53:03 AM Page 44 Page 1 of 1

DH 9/20/12

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	low level
Sample Name:	120870 T.B.	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	1.00	File Name:	xx014.rlt		
Comments:	120870 Trip Blank				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	13:54	1,566	1.275	0.252	417	0.177	0.035
2	14:01	1,572	1.280	0.253	290	0.068	0.013
3	14:09	1,586	1.292	0.255	312	0.087	0.017
	Avg.	1,575	1.282	0.253	340	0.111	0.022
	Std. Dev.	10.26			67.87		
	RSD (%)	0.65			19.98		

WH 9/20/12

'*' = modified '-' = unused

Report generated by OI Analytical's TOC Reporter v [illegible], using WinTOC 1010 v8.2 and 1010 Firmware [illegible]

Sample Information:

Sample #:		Operator Name:	Unknown	Method Name:	lowlevel
Sample Name:	120870-58437	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.00	File Name:	xx016.rlt		
Comments:	120870-58437				

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Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	14:25	2,224	9.201	1.818	1,645	6.137	1.213
2	14:33	2,107	8.698	1.719	1,547	5.716	1.130
3	14:41	2,318	9.605	1.898	1,596	5.926	1.171
	Avg.	2,216	9.168	1.812	1,596	5.926	1.171
	Std. Dev.	105.71			49.00		
	RSD (%)	4.77			3.07		

WH 9/20/12

"*" = modified "-" = unused

Report generated by OI Analytical's TOC Reporter v5.2, using WinTOC 1810 v5.2 and 1010 Firmware v5.2

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	lo[illegible]vel
Sample Name:	120670-56438	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.00	File Name:	xx018.rlt		
Comments:	120670-56438				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	14:57	1,867	7.748	1.531	1,200	4.242	0.838
2	15:04	1,900	7.890	1.559	1,089	3.765	0.744
3	15:13	1,963	8.161	1.613	1,066	3.666	0.724
	Avg.	1,910	7.933	1.568	1,118	3.891	0.769
	Std. Dev.	48.77			71.65		
	RSD (%)	2.55			6.41		

WH 9/20/12

Report generated by [illegible]

"*" = modified "-" = unused

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	low level
Sample Name:	120870-58439	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.57	File Name:	xx020.rlt		
Comments:	120870-58439 received with only 7 mL of sample				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	15:29	1,170	5.237	1.035	5,047	23.229	4.591
2	15:36	1,154	5.161	1.020	4,906	22.554	4.457
3	15:45	1,179	5.281	1.044	5,190	23.913	4.726
	Avg.	1,168	5.226	1.033	5,048	23.232	4.591
	Std. Dev.	12.66			142.00		
	RSD (%)	1.08			2.81		

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WH 9/20/12

"*" = modified "~" = unused

Report generated by OI Analytical's TOC Reporter v5.2, using ... 1030 v5.2 and 1010 Firmware v5.2

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	low level
Sample Name:	120870-58440	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.33	File Name:	xx022.rlt		
Comments:	120870-58440 received with only 6 mL of sample				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	16:01	1,303	6.763	1.337	4,937	25.887	5.116
2	16:08	1,303	6.763	1.337	4,744	24.836	4.906
3	16:17	1,327	6.893	1.362	5,093	26.735	5.284
	Avg.	1,311	6.806	1.345	4,925	25.819	5.103
	Std. Dev.	13.86			174.83		
	RSD (%)	1.06			3.55		

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WH 9/20/12

"*" = modified "^" = unused

Report generated by GE Analytical's TOC Reporter v5.2, using WinTOC 5310 v5.2 and 5310 Firmware v5.2

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	low level
Sample Name:	120870-58441	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.00	File Name:	xx024.rlt		
Comments:	120870-5841				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	16:33	1,203	4.848	0.958	4,341	17.852	3.528
2	16:40	1,112	4.457	0.881	4,089	16.769	3.314
3	16:48	1,160	4.663	0.921	4,382	18.028	3.563
	Avg.	1,158	4.656	0.920	4,271	17.550	3.468
	Std. Dev.	45.52			158.66		
	RSD (%)	3.93			3.72		

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Report generated by OI Analytical's TOC Reporter v3.2, using WinTOC 1010 v3.2 and 1010 Firmware v5.2

WH 9/20/12

'*' = modified '-' = unused

Sample Information:

Sample #:	1	Operator Name:	Unknown	Method Name:	low level
Sample Name:	120870-58442	Sample Volume (ml):	5.060	Sequence Name:	091912
Run Type:	SAMPLE	Loop Volume (ml):	5.060	Calibration Name:	091812
Analysis Mode:	TICTOC	Loop Size (ml):	5.000	PAM Mode:	OFF
Total Reps:	3	Sample Intro:	AUTOSAMPLER	PAM Volume (ul):	200
Date:	19Sep2012	Remote Start:	OFF	PAM Purge (min:sec):	0:30
Dilution Factor:	5.00	File Name:	xx026.rlt		
Comments:	120870-58442				

Sample Results:

Rep #	Time	TIC Area (cnts)	TIC Mass (ugC)	TIC Conc (ppm)	TOC Area (cnts)	TOCMass (ugC)	TOC Conc (ppm)
1	17:05	2,638	10.967	2.167	3,891	15.922	3.147
2	17:12	2,442	10.125	2.001	3,754	15.333	3.030
3	17:20	2,660	11.062	2.186	3,950	16.176	3.197
	Avg.	2,580	10.718	2.118	3,865	15.811	3.125
	Std. Dev.	120.02			100.55		
	RSD (%)	4.65			2.60		

WH 9/20/12

"" = modified "" = unused

Report generated by OI Analytical's TOC Reporter v5.3 using WinTOC 1010 v5.2 and 1010 Firmware [illegible]

Calibration Summary

EPA 25 & SCAQMD Method 25.1 / 25.3 Calibration Curve (GC/FID/TCA #4)

ANALYTE: Carbon Monoxide **Analysis Date:** 1/5/2011 **Analyst:** DH

Theoretical Concentration (ppmv)	Retention time (min)	Response Area	RPD from initial result (+/- 5%)	Std Deviation	Theoretical Concentration (ppmv)	Response Area (mean)	Calculated Concentration (From Mean)	Recovery (+/- 10 %)
1.02	0.81	18212						
1.02	0.81	18165	0.3	33.23	1.02	18189	1.00	98
5.12	0.81	88246						
5.12	0.80	92667	4.9	3126.12	5.12	90457	4.98	97
25.60	0.80	455366						
25.60	0.80	445648	2.2	6871.66	25.60	450507	24.81	97
51.20	0.80	922588						
51.20	0.80	916054	0.7	4620.24	51.20	919321	50.62	99
256.00	0.79	4647803						
256.00	0.79	4658033	0.2	7233.70	256.00	4652918	256.20	100

Avg RT 0.80 **RT Window** +/- 0.20 min

Calb. Type	Linear	*Y=MX+B*
R2 value:	1.0000	*Must be > 0.990*
Intercept (B)	0.00	*Included*
Lin Const (M)	18161.00	

Calibration Verification Standards:
Check Standard Concentrations: 10 ppmv & 50 ppmv

CCV	Retention Time	Result (ppmv)	% Rec
Low 10 ppmv	0.81	10.06	98.2
High 50 ppmv	0.80	51.15	99.9

Must be +/- 10 % of Theoretical Concentration

Lab Manager (Initial & date): [illegible] 1/5/11

EPA 25 & SCAQMD Method 25.1 / 25.3 Calibration Curve (GC/FID/TCA #4)

ANALYTE: **Methane** **Analysis Date:** 1/6/2011 **Analyst:** DH

Theoretical Concentration (ppmv)	Retention time (min)	Response Area	RPD from initial result (+/- 5%)	Std Deviation	Theoretical Concentration (ppmv)	Response Area (mean)	Calculated Concentration (From Mean)	Recovery (+/- 10 %)
1.06	1.06	20600						
1.06	1.06	21229	3.0	444.77	1.06	20915	1.04	98
5.28	1.06	107206						
5.28	1.06	110036	2.6	2001.11	5.28	108621	5.40	102
26.40	1.06	538602						
26.40	1.06	526699	2.2	8416.69	26.40	532651	26.46	100
52.80	1.06	1080860						
52.80	1.06	1075165	0.5	4026.97	52.80	1078013	53.55	101
264.00	1.06	5307017						
264.00	1.06	5315276	0.2	5839.99	264.00	5311147	263.84	100

Avg RT 1.06 **RT Window** +/- 0.20 min

Calb. Type	Linear	*Y=MX+B*
R2 value:	1.0000	*Must be > 0.990*
Intercept (B)	0.00	*included*
Lin Const (M)	20130.00	

Calibration Verification Standards:
Check Standard Concentrations: 10 ppmv & 50 ppmv

CCV	Retention Time	Result (ppmv)	% Rec
Low 10 ppmv	1.06	10.92	103.4
High 50 ppmv	1.05	54.65	103.5

Must be +/- 10 % of Theoretical Concentration

Lab Manager (Initial & date): [illegible] 1/5/11

EPA 25 & SCAQMD Method 25.1 / 25.3 Calibration Curve (GC/FID/TCA #4)

ANALYTE: Ethane **Analysis Date:** 1/5/2011 **Analyst:** DH

Theoretical Concentration (ppmv)	Retention time (min)	Response Area	RPD from initial result (+/- 5%)	Std Deviation	Theoretical Concentration (ppmv)	Response Area (mean)	Calculated Concentration (From Mean)	Recovery (+/- 10 %)
1.00	4.26	36198						
1.00	4.26	36579	1.0	269.41	1.00	36389	1.02	102
25.05	4.26	829238						
25.05	4.26	864611	4.2	25012.49	25.05	846925	23.85	95
50.10	4.42	1732731						
50.10	4.25	1727613	0.3	3618.97	50.10	1730172	48.72	97
250.50	4.22	9004460						
250.50	4.22	8814690	2.1	134187.65	250.50	8909575	250.90	100

Avg RT 4.27 **RT Window** +/- 0.20 min

Calib. Type	Linear	*Y=MX+B*
R2 value:	0.9997	*Must be > 0.990*
Intercept (B)	0.00	*Included*
Lin Const (M)	35511.09	

Calibration Verification Standards:
Check Standard Concentrations: 1 ppmv & 10 ppmv

CCV	Retention Time	Result (ppmv)	% Rec
Low 1 ppmv	4.22	0.97	97.2
High 10 ppmv	4.23	9.77	97.5

Must be +/- 10 % of Theoretical Concentration

Lab Manager (Initial & date): 1/5/11

EPA 25 & SCAQMD Method 25.1 / 25.3 Calibration Curve (GC/FID/TCA #4)

ANALYTE: TNMNEOC (as Propane) **Analysis Date:** 1/5/2011 **Analyst:** DH

Theoretical Concentration (ppmv)	Retention time (min)	Response Area	RPD from initial result (+/- 5%)	Std Deviation	Theoretical Concentration (ppmv)	Response Area (mean)	Calculated Concentration (From Mean)	Recovery (+/- 10 %)
1.04	6.85	47420						
1.04	6.85	47796	0.8	265.87	1.04	47608	0.95	91
5.20	6.85	247534						
5.20	6.84	253152	2.2	3972.53	5.20	250343	5.00	96
26.00	6.84	1256269						
26.00	6.84	1240551	1.3	11114.30	26.00	1248410	24.91	96
52.00	6.84	2583994						
52.00	6.84	2549279	1.4	24547.21	52.00	2566637	51.21	98
260.00	6.84	13019008						
260.00	6.84	13068602	0.4	35068.25	260.00	13043805	260.27	100

Avg RT 6.84 **RT Window** +/- 0.20 min

Calib. Type	Linear	*Y=MX+B*
R2 value:	1.0000	*Must be > 0.990*
Intercept (B)	0.00	*Included*
Lin Const (M)	50116.30	

Calibration Verification Standards:

Check Standard Concentrations: 1.0 ppmv, 10 ppmv & 50 ppmv

CCV	Retention Time	Result (ppmv)	% Rec
1.0 ppmv BF	6.86	0.99	95.4
Low 10 ppmv	6.85	10.11	97.2
High 50 ppmv	6.84	51.67	99.4

Must be +/- 10 % of Theoretical Concentration

Lab Manager (Initial & date): 1/5/11

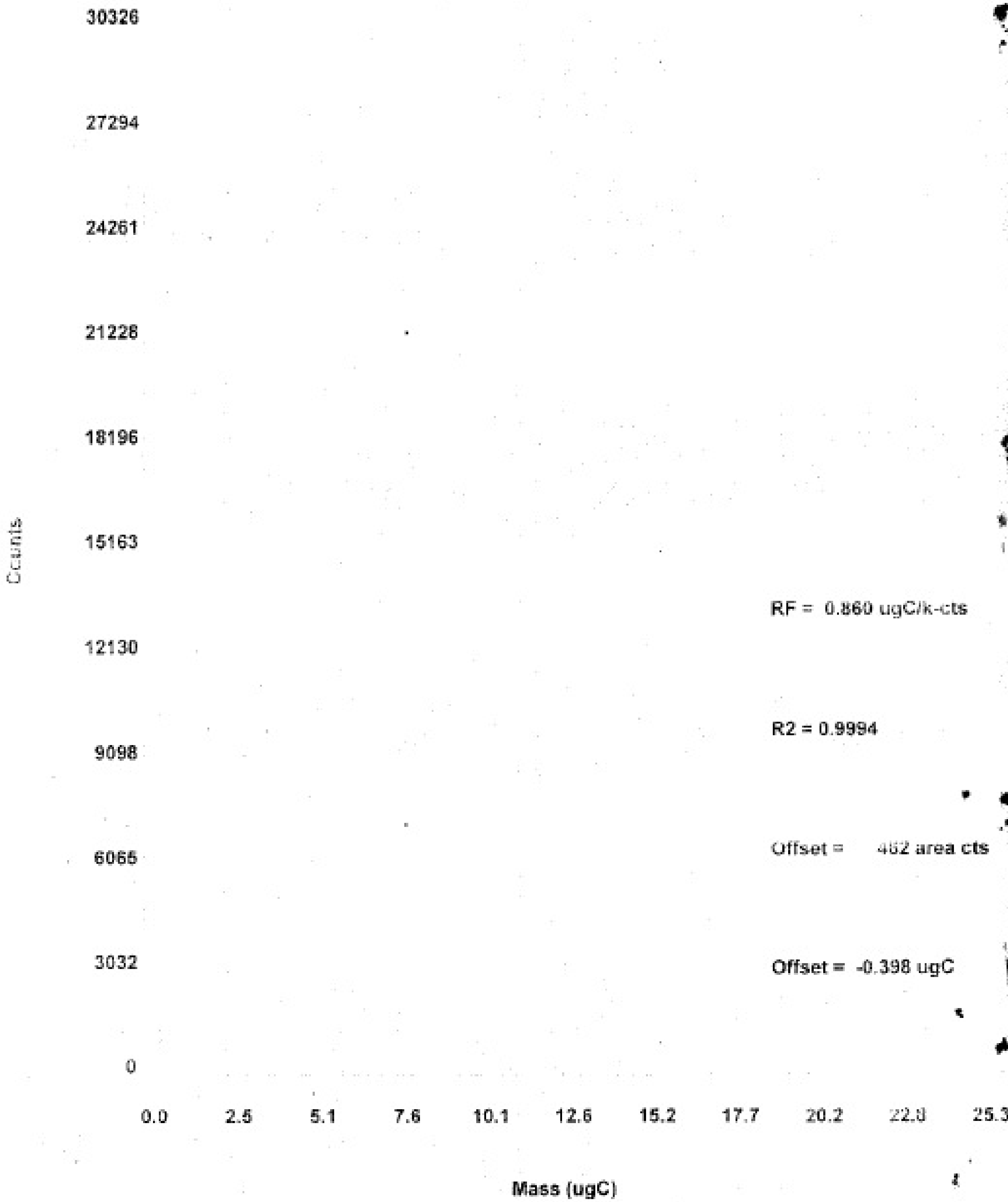
```
************************************************************************
**                          CALIBRATION                               **
************************************************************************

D91812  Tue Sep 18 11:12:56 2012

Std. #  Used  Conc. (ppm)  Volume (mL)
------  ----  -----------  -----------      RF (ugC/k-cts):      0.860
   1    Yes       0.000          5.000      R-Squared:           0.9994
   2    Yes       0.100          5.000      Offset (cts):          462
   3    Yes       0.500          5.000      Offset (ugC):        0.398
   4    Yes       1.000          5.000      Calibration Mode:    TOC
   5    Yes       5.000          5.000      Allow Editing:       No

Rep  Std. 1   Std. 2   Std. 3   Std. 4   Std. 5
---  -------- -------- -------- -------- --------
 1       590     1289     3523     6701    30327
 2       445     1061     3099     6150    29196
 3       463     1031     3119     6368    30141
 4         -        -        -        -        -
 5         -        -        -        -        -         (* = unused)
 6         -        -        -        -        -
 7         -        -        -        -        -
 8         -        -        -        -        -
 9         -        -        -        -        -
10         -        -        -        -        -
```

Calibration - 091812 (TOC, 18Sep2012 11:12)



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Plant Data:
Date of test: 9/12/12
Average Diesel Fuel Usage Rate: 0.91 GPH
Engine Start Time: 11:22:00 AM
Engine Stop Time: 8:48:00 PM
Total Engine Time: 9 hrs 26 min
Total Diesel Fuel Usage: 8.6 Gallons
Average power (11:22 AM – 8:48 PM): 29.2 kW

Total amount of pellets going into reactor (11:22 AM – 8:48 PM): 712 lbs
Average Syngas (waste fuel rate) from 11:22 AM -8:48 PM: 130 CFM
Total Syngas usage (11:22 AM -8:48 PM): 73,580 CF

Appendix G: Letter from US EPA

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

DEC 0 4 2012

Mr. Stephen Armstrong
MSW Power Corporation
42 Nagog Park Suite 110
Acton, MA 01720

Dear Mr. Armstrong:

Thank you for your letter dated September 12, 2012 requesting the U.S. Environmental Protection Agency (EPA) determine whether MSW Power Corporation's Green Energy Machine located at the Plymouth County Correctional Facility in Plymouth, Massachusetts is subject to the Standards of Performance for Other Solid Waste Incinerators Rule, 40 CFR Part 60, Subpart EEEE, and the National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, 40 CFR Part 63, Subpart JJJJJJ. This letter provides you with a written applicability determination on these rules.

Description of the Facility

Based on information provided in your September 12, 2012 letter and subsequent correspondences, MSW Power owns a waste-to-energy system currently located on the grounds of the Plymouth County Correctional Facility. The system was built in 2008 and operated in Waltham, MA with approval from the Massachusetts Department of Environmental Protection as a Major Development Project. The system was shipped from Waltham to Plymouth County Correctional Facility on May, 31, 2012, and installation of the system was completed on June 18, 2012. The waste-to-energy system, known as the Green Energy Machine (GEM), consists of a waste pre-processing system and pelletizer, a gasification unit, and a backend unit that fires synthetic gas created during the gasification process.

Waste is fed into the waste pre-processor that shreds and dries the material to a specific size and moisture content. Undesirable material is separated using a density separator, and the remaining processed waste is compressed into fuel pellets. Fuel pellets are retained in a hopper for storage and fed into the gasification unit at a constant rate. Pellets enter the downdraft gasification system from the top and move down through nine zones, seven of which have controlled secondary air introduction to regulate different temperatures and chemical reactions that occur at different zones of the gasifier. Char and a synthetic gas product (syngas) are the only two products to leave the gasification unit. Char is combined with pre-processed waste and used as fuel, and the syngas is conditioned for use in a combustion unit. Conditioning consists of particulate filtering and syngas cooling via a heat recovery system. Waste pre-processing, pelletization, fuel pellet storage, gasification, and syngas conditioning all occurs within a modified shipping container.

Conditioned gas is transported through steel piping to a unit which combusts the syngas, located in a separate modified shipping container. Combustion of the syngas heats a thermal transfer

loop containing a propylene glycol/water mixture. The thermal transfer loop is used to pre-heat the hot water circulation system within the jail.

The Plymouth County Correctional Facility produces approximately one ton of waste per day. Waste consists of cafeteria waste, office waste from correctional staff, and inmate-generated waste from prison cells. The existing recycling program at the Plymouth County Correctional Facility will continue to divert recyclables from the waste stream.

Request from MSW Power

MSW Power is seeking an applicability determination on whether the GEM gasification unit located at Plymouth County Correctional Facility is subject to the Standards of Performance for Other Solid Waste Incinerators Rule, 40 CFR Part 60, Subpart EEEE; and the National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, 40 CFR Part 63, Subpart JJJJJJ.

EPA's Determination

Standards of Performance for Other Solid Waste Incinerators Rule, 40 CFR Part 60, Subpart EEEE (Subpart 4E)

Subpart 4E, published on December 16, 2005 (70 FR 74892), established new source performance standards for other solid waste incineration units. Under § 60.2880, other solid waste incineration units are very small municipal waste combustion units and institutional waste incineration units. Under § 60.2885 and § 60.2886, this subpart applies to new incineration units, which are defined as units where construction commenced after December 9, 2004 or reconstruction or modification commenced on or after June 16, 2006.

Under § 60.2977, prisons are defined as institutional facilities. Plymouth County Correctional Facility meets this criterion and is classified as an institutional facility. Institutional waste incineration units are defined under § 60.2977 as any combustion units that combust institutional waste and is a distinct operating unit of the institutional facility that generates the waste, and institutional waste is defined as solid waste that is combusted at any institutional facility where the distinct operating unit does not provide for energy recovery.

The GEM is capable of providing energy recovery, as waste generated at Plymouth County Correctional Facility can be processed and gasified by the GEM to produce syngas, which is fired by an onsite unit, creating thermal energy. The thermal energy is recovered by heating a thermal transfer loop containing a propylene glycol/water mixture, and the thermal transfer loop is used to pre-heat the hot water circulation system within the jail. Because the GEM provides for energy recovery, Plymouth County Correctional Facility's waste stream does not meet the definition of institutional waste under § 60.2977 when it is being disposed of through the GEM. EPA has determined that because of this exclusion, the GEM is not defined as an institutional waste incineration unit when used to gasify waste and provide for energy recovery at the Plymouth County Correctional Facility, and is therefore not subject to Subpart 4E.

This applicability determination is based on 40 CFR Part 60, Subpart EEEE as promulgated on December 16, 2005 (70 FR 74892). EPA intends to revise the emission standards for other solid

waste incineration units in the future, and that rulemaking will address all other solid waste incineration units except sewage sludge incineration units. Plymouth County Correctional Facility should remain cognizant of any rule revisions and understand what impact such changes may have on their operation.

National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers, 40 CFR Part 63, Subpart JJJJJJ (Subpart 6J)

MSW Power operates a Weil McLain Series 88 boiler able to supply the Plymouth County Correctional Facility with 1.0 million Btu/hr of heat in the existing hot water system. Syngas generated by the gasifier is the only fuel combusted in the boiler. In the September 12, 2012 letter, MSW Power provided facility-wide potential to emit calculations to document the Plymouth County Correctional Facility is an area source of hazardous air pollutants (HAP).

Subpart 6J applies to industrial, commercial and institutional boilers located at area sources of HAP. Subpart 6J does not apply to gas-fired boilers. Under § 63.11237, a "gas-fired boiler" includes any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuels. Periodic testing of liquid fuel shall not exceed 48 hours per calendar year. Under § 63.11237, "gaseous fuel" includes, but is not limited to, natural gas, process gas, landfill gas, coal derived gas, refinery gas, hydrogen, and biogas. EPA has determined that because MSW Power's boiler burns only syngas, a gaseous fuel, the boiler is not subject to Subpart 6J. This applicability determination is made in reliance on the accuracy of the information provided to EPA by MSW and Plymouth County Correctional Facility, and does not relieve MSW Power or the Plymouth County Correctional Facility of the responsibility for complying fully with any and all applicable federal, state and local laws, regulations and permits. If you have any questions regarding this letter, please feel free to contact the following members of my staff: Susan Lancey at (617) 918-1656 regarding Subpart 6J; and Patrick Bird at (617) 918-1287 regarding Subpart 4E.

Sincerely Yours,

Dvd B Conroy

David B. Conroy
Chief, Air Programs Branch

Cc:
Michael T. Cheney, Plymouth County Sheriff's Department
Thomas Cushing, MassDEP Southeast Regional Office
Marc Wolman, MassDEP Headquarters Office